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CALENDAR FOR THE OPENING OF THE ACADEMIC YEAR 1901-1902.

Monday, August 5.—Undergraduate applications for admission, and recommendations issued by the principals of accredited schools, should be filed with the Recorder of the Faculties on or before this date. This may be done by mail. Credentials from other universities, and from secondary schools outside of California, should be filed as early as possible, in order that applicants who may be required to take entrance examinations may have due notice.

Monday, August 12.—Academic year begins.

Monday-Wednesday, August 12-14 (the first three days of the academic year).—Entrance Examinations, at North Hall, Berkeley, for the Academic Colleges, Hastings College of the Law, and the Medical Department. Filing of applications for admission to graduate and to special standing.

Wednesday and Thursday, August 14 and 15.—Professors and Instructors will keep office-hours for consultation with students and applicants.

Thursday, August 15, from 9:00 a.m. to 5:00 p.m.—Registration Day.—At the Gymnasium: Registration of graduate and upper-class students for courses of the first half-year. Students who elect courses beginning on Thursday afternoon must register before 1:00 o'clock p.m. Registration of upper-class students after Thursday will be permitted only in cases where the students have been granted leave of absence by the proper Faculty or Dean. All officers of instruction will keep office hours on the morning of Registration Day, from 9:30 until 12:00; and on the afternoon of that day, at such times as they may announce.

Thursday, August 15, 1:00 p.m.—Instruction in upper classes begins. Students must obtain the Recorder's Certificate of Registration in time to appear for enrollment by the instructor at the first meeting in each of the courses.

Monday, August 19.—Organization of Instruction for Freshmen.

8:30–4:30, in the Gymnasium: Admission cards issued to intrants.

11:15 a.m., in the Gymnasium: Intrants assemble to meet the President, the Deans, and the Freshman instructors and advisers.

12:00–4:30, in the Gymnasium: Intrants file their registration cards for the first half-year.

8:30 p.m., in the Gymnasium: University rally, to welcome the Freshmen.

Before filing their registration cards for the half-year, intrants should provide themselves with the following publications: (1) REGISTER for 1900–01, (2) ANNOUNCEMENT OF COURSES, (3) SCHEDULE OF EXERCISES, (4) CIRCULAR OF INSTRUCTIONS TO FRESHMEN, (5) REGISTRATION CARD. Intrants should consult their advisers before registering.

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UNIVERSITY OF CALIFORNIA

ANNUAL ANNOUNCEMENT

OF

COURSES OF INSTRUCTION

IN THE COLLEGES OF LETTERS, SOCIAL SCIENCES, NATURAL SCIENCES, COMMERCE, AGRICULTURE, MECHANICS, MINING, CIVIL ENGINEERING, AND CHEMISTRY,

FOR THE ACADEMIC YEAR 1901-1902

BERKELEY
The University Press
1901

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COURSES OF INSTRUCTION OFFERED IN THE COLLEGES AT BERKELEY FOR THE ACADEMIC YEAR 1901–02.

The hours of recitation, lecture, etc., are given for most of the courses. The following abbreviations are used: M., Monday; Tu., Tuesday; W., Wednesday; Th., Thursday; F., Friday; S., Saturday; A, Agricultural Experiment Station Building; B, Botany Building; C, Chemistry Building; E, East Hall; G, Harmon Gymnasium; H, Hearst Gymnasium; L, Bacon Art and Library Building; M, Mechanics Building; MC, Mining and Civil Engineering Building; N, North Hall; O, Students' Observatory; P, Philosophy Building; S, South Hall. Courses permissible for the Group Elective are denoted by the abbreviation (G.E.).

PHILOSOPHY.

GEORGE H. HOWISON, M.A., LL.D., Mills Professor of Intellectual and Moral Philosophy and Civil Polity.

CHARLES M. BAKEWELL, Ph.D., Associate Professor of Philosophy.

GEORGE M. STRATTON, Ph.D., Associate Professor of Psychology, and Director of the Psychological Laboratory.

WILLIAM P. MONTAGUE, Ph.D., Instructor in Philosophy.

HARRY A. OVERSTREET, A.B., B.Sc.(Oxon.), Instructor in Philosophy.

JOSEPH E. BRAND, Ph.B., Assistant in the Psychological Laboratory.

The Group Elective. Complete Group Electives in Philosophy can be made up in four different directions, *viz.*: 1, in Philosophy proper, including its history and the direct discussion of its chief problems, but more especially its metaphysical and ethical problems; II, in Psychology; III, in Logic and the Theory of Knowledge; IV, in the Department at large. Under IV, there can be several combinations, according to the student's preference; for exact information as to these, the head of the department must be consulted.

In combining Philosophy with other subjects to form a Group Elective, not fewer than 12 units in Philosophy are permissible. Courses 1, 2, 19, and 20 cannot form part of any Group Elective. All

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courses but 15, 19, and 20 may be taken as Free Electives, subject to the prerequisite for each.

Teachers' Courses. Courses 1, 2, 3, 4, and 13 are especially valuable for teachers, actual or prospective.

1. **Formal Logic.** Dr. MONTAGUE and Mr. OVERSTREET.

With especial reference to practice on division, definition, the forms and transformations of judgments, the syllogism, deductive and inductive, and fallacies.

3 hrs., either half-year. M., W., F. In four sections: Sections I and II, 1:00; Section III, 2:00; Section IV, 4:00. Prerequisite: At least Sophomore standing, or status of Special Student in Education.

2. **General Psychology.**
Associate Professor STRATTON and Dr. MONTAGUE.

The facts of consciousness, their classification and analysis, and their relations to the nervous system; with demonstrations in brain anatomy and in psychological experiment.

3 hrs., either half-year. In three sections. Associate Professor STRATTON, lecture to all sections, M., 3:00, and Section 1, W., F., 3:00; Dr. MONTAGUE, Section II, W., F., 9:00, Section III, W., F., 3:00. Prerequisite: Usually Junior standing or status of Special Student in Education; but Sophomores free from deficiencies may take the course.

3. **History of Philosophy.** (G.E.)*
Professor HOWISON and Associate Professor BAKEWELL.

Critical account of Occidental Philosophy in outline, from its beginnings in Ionia to the present time.

2 hrs., throughout the year. M., F., 10:00. First half-year, Ancient and Mediæval Philosophy, Associate Professor BAKEWELL; second half-year, Modern Philosophy, Professor HOWISON. Prerequisite: Usually, Junior standing or status of Special Student in Education; but Sophomores free from deficiencies may take the course.

SPECIAL NOTICE.—Courses 1, 2, and 3 may all be taken in one year, if students so elect; that is, they may accompany Course 3 with Course 1 in the first half-year, and with Course 2 in the second, or *vice versa*. Or they may take Courses 1 and 2 together in either half-year.

*May only be included in the Group Elective by students combining Philosophy with other subjects.

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4. **Ethics, including Civil Polity.** (G.E.)
Professor HOWISON, assisted by Mr. OVERSTREET.

A general introduction to the subject, including: An outline history of ethical theories; critique of the conflict between hedonism and rigorism, determinism and freedom, pessimism and optimism; investigation of the nature of a State, and its bearing on the limits of liberty and allegiance; sketch of the history of political theories.

4 hrs., throughout the year. M., Tu., Th., F., 9:00. Prerequisite: Courses 1, 2, and 3.

SPECIAL NOTICE.—In taking Course 4 as part of the Group Elective in the special direction of Psychology or of Logic, the student may divide it, so as to make it include but four units. This may be done (1) by taking the subject during the first half-year only; or (2) by taking it during the second half-year only. For this purpose the first part must be registered as Course 4A, and the second part as Course 4B. But this privilege is usually restricted to students with the special Group Electives named; in the case of others, special application for it must be made to the head of the department.

5. **The Philosophy of Kant.** (G.E.) Professor HOWISON.

The cardinal distinctions and doctrines of the system expounded and criticized.

2 hrs., throughout the year. Tu., Th., 11:00. Prerequisite: Courses 1, 2, and 3. (Course 13 is advised as precedent, and Course 4 as accompaniment.)

6. **Introduction to Psychological Experiment.** (G.E.)*
Associate Professor STRATTON, assisted by Mr. BRAND.

Detailed demonstration of characteristic groups of experiments, with lectures on the methods of research.

3 hrs., second half-year. Tu., 2:00 (2 hrs.); Th., 3:00. Prerequisite: Course 2. (Students are advised to bring also Courses 1 and 3, or at any rate to take Course 3 as an accompaniment.)

10. **Inductive Logic.** (G.E.) Dr. MONTAGUE.

Based on a study of Mill's Logic and Pearson's Grammar of Science, with especial reference to the criticism of the empiristic philosophy of logic.

2 hrs., throughout the year. Tu., Th., 4:00. Prerequisite: Course 1; or status of Special or regular Student in Education, if the applicant is approved after conference with the instructor. Course 3 must either precede or accompany this course. (Courses 2, 6, and 13 would form valuable auxiliaries.)

* May only be included in the Group Elective by students combining Philosophy with other subjects.

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11. Advanced General Logic. (G.E.) Dr. MONTAGUE.

Based on a study and criticism of the writings of Lotze, Bradley, and Bosanquet.

2 hrs., throughout the year. Prerequisite: Course 10.

*13. Psychological Conference. (G.E.)

Associate Professor STRATTON.

Discussion of selected topics in psychology, in their historical setting, and as treated by writers of the present day.

2 hrs., first half-year. M., 10:00-12:00. Prerequisite: Courses 3 and 6.

14. Psychological Laboratory. (G.E.)

Associate Professor STRATTON, assisted by Mr. BRAND.

Individual investigation of special problems assigned for practice in the use of apparatus, and in the application of the methods of psychological experiment.

9 hrs., second half-year—3 units. M., Tu., W., Th., F., 1:00–4:00. Prerequisite: Course 6. (A desirable accompaniment is Course 13 or Course 5; or both, when practicable.)

15. Psychological Laboratory: Advanced. (G.E.)

Associate Professor STRATTON, assisted by Mr. BRAND.

Individual investigation of special problems assigned for original research.

Not less than 9 hrs., throughout the year—3 units; but at least 15 hrs.—5 units—recommended. Units and hours to be arranged with each student. Prerequisite: Course 14, or its equivalent; permission to elect the course, obtained from the director after conference. The course is primarily for Graduates, though qualified Seniors will be admitted to it.

16. Plato and Aristotle. (G.E.) Associate Professor BAKEWELL.

Introduction to their systems by a comparative study.

2 hrs., throughout the year. Tu., Th., 2:00. Prerequisite: Courses 1, 2, and 3. (Familiarity with Greek, Latin, and German or French, is desirable, though not for the present required.)

*Not to be given in 1901–02.

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17. Scholastic Philosophy. (G.E.)
Associate Professor BAKEWELL.

An introductory study of mediæval thought, with especial reference to the systems of Aquinas and Scotus.

2 hrs., throughout the year. Tu., Th., 3:00. Prerequisite: Courses 1, 2, and 3; Course 16, as accompaniment, if not previously completed. (Familiarity with Latin, Greek, and German or French, is an important adjunct, but is not for the present required.)

18. Theory of Knowledge. (G.E.) Associate Professor BAKEWELL.

Development and criticism of the leading theories of knowledge, aiming at a constructive result.

3 hrs., second half-year. M., W., F., 2:00. Prerequisite: Courses 1, 2, and 3.

19. Seminary in the Theory of Knowledge.
Associate Professor BAKEWELL.

Investigation of new and unsettled questions in this field.

2 hrs., throughout the year. Hours to be arranged with members. Prerequisite: Graduate standing, with Courses 11 and 18; or their equivalent, resting on equivalent preparation; permission to join the seminary, obtained from the director after conference.

20. Philosophical Seminary. Professor HOWISON.

Topics changed from year to year. For 1901–02, Hegel's Logic or Problems in Metaphysics, as may be decided after organization.

2 hrs., throughout the year, at hours to be arranged with members. Prerequisite: Graduate standing, a good reading knowledge of German, and thorough acquaintance with the subjects of Courses 1-5, 10 and 11, 16-18; permission to join the seminary, obtained from the director after conference.

21. English Philosophy from Hobbes to Spencer. (G.E.)
Associate Professor BAKEWELL.

A critical study of the development of English empiricism.

2 hrs., throughout the year. M., F., 1:00. Prerequisite: Courses 1, 2, and 3.

22. Modern French Philosophy. (G.E.)
Associate Professor BAKEWELL.

The development of French philosophy in the eighteenth and nineteenth centuries, with especial reference to the schools of Cousin, Comte, and Renouvier.

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2 hrs., first half-year. M., F., 2:00. Prerequisite: Courses 1, 2, and 3. (A reading knowledge of French is expected of students electing this course.)

23. German Idealism after Kant: The Philosophy of Fichte, Schelling, and Hegel. (G.E.)

Associate Professor BAKEWELL.

A study of the development of the Kantian philosophy in Germany, with especial reference to the system of Hegel.

2 hrs., second half-year. M., F., 10:00. Prerequisite: Course 5. (A reading knowledge of German is important for this course.)

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EDUCATION.

*Elmer Ellsworth Brown, Ph.D., Professor of the Theory and Practice of Education.

Fletcher B. Dresslar, Ph.D., Assistant Professor of the Science and Art of Teaching.

Ernest C. Moore, LL.B., Ph.D., Instructor in Education.

Thomas L. Heaton, B.L., LL.B., Assistant in Education.

It is the purpose of the courses in Education to afford such instruction in the principles and the history of education as is desirable in a truly liberal culture, and to provide adequate professional preparation for University students who intend to teach. The undergraduate courses are reserved for the third and fourth years of college residence. Students who purpose taking any of the courses in Education are advised to prepare for the study by taking one or more courses in Psychology.

The Group Elective. Eighteen units of the Group Elective in Education must be taken in the Department of Education. The remaining six units may be chosen from courses in the Department of Education, or in the Department of Philosophy, or in both. Not more than four units of the six may be taken in a pedagogical course in some other department in which the student is to receive the recommendation for a teacher's certificate. Students may also make the Group Elective in Philosophy and Education together, subject to the limitation indicated by the Department of Philosophy.

Courses in Other Departments. Courses of special interest and value to teachers are offered in several departments of the University. Attention is called to the announcement of such courses in Philosophy, History and Political Science, Greek, Latin, English, Mathematics, Physics, Chemistry, and Zoölogy. The University Extension courses and the courses in the Summer School are usually of like interest and value to teachers.

Teachers' Certificates. For the conditions under which Recommendations for Teachers' Certificates are issued, see Joint Regulations of the Faculties, in the University Register.

*Absent on leave, 1901–02.

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1. The Practice of Teaching. (G.E.) Mr. HEATON.

Lectures and readings three hours a week, together with school observation or practice of teaching under the direction of the instructor.

4 or 5 hrs., second half-year. W., 4:00; S., 10:00–12:00. Prerequisite: At least Junior standing; three courses selected from 3 (or 4), 5, 6, 10A, 12, 13A, and 14. Admission only on consultation with the instructor in charge.

1A. Practice Course. (G.E.) Mr. HEATON.

Lectures and readings three hours a week, together with school observation or practice of teaching under the direction of the instructor.

4 or 5 hrs., first half-year. Tu., 4:00; S., 10:00–12:00. Prerequisite: At least Junior standing; three courses selected from 3 (or 4), 5, 6, 10A, 12, 13A, and 14. Admission only on consultation with the instructor in charge.

2A. School Supervision. (G.E.) Assistant Professor DRESSLAR.

Seminary for the study of problems in the organization, grading, and management of schools; intended especially for those who are preparing to become school principals or superintendents.

2 hrs., first half-year. S., 8:00–10:00. Primarily for graduates. Admission only on consultation with instructor.

*2B. Visitation of Schools. (G.E.) Assistant Professor DRESSLAR.

Three hours a week, with special reference to observing methods of organization, grading, and management.

1 hr., first half-year. Course 2B may be taken only in conjunction with Course 2A.

3. The History of Education: Earlier Periods. (G.E.) Dr. MOORE.

3 hrs., first half-year. M., W., F., 3:00. Prerequisite: Course 2 or 3 in Philosophy.

4. The History of Education: Later Periods. (G.E.) Dr. MOORE.

3 hrs., second half-year. M., W., F., 3:00. Prerequisite: Course 2 or 3 in Philosophy.

*5. The Theory of Education. (G.E.) Professor BROWN.

Lectures, discussions, and readings.

*Not to be given in 1901–02.

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3 hrs., first half-year. M., W., F., 10:00. Prerequisite: At least Junior standing; Courses 1 and 2 in Philosophy.

6. School Systems. (G.E.) Assistant Professor DRESSLAR.

Lectures and readings.

2 hrs., second half-year. M., F., 9:00. Prerequisite: At least Junior standing.

*7A. Seminary for the Study of Special Problems in Education. (G.E.) Professor BROWN.

2 hrs., first half-year. S., 10:00–12:00. Open to a limited number of graduate students.

*7B. Seminary for the Study of Special Problems in Education. (G.E.) Professor BROWN.

2 hrs., second half-year. S., 10:00–12:00. Open to a limited number of graduate students. 7B may be elected in addition to 7A without repetition of subject-matter. 7A or 7B may be elected separately.

10A. Introduction to Pedagogy. (G.E.) Assistant Professor DRESSLAR.

Lectures, discussions, and readings.

3 hrs., first half-year. M., W., F., 9:00. Prerequisite: At least Junior standing; Course 2 in Philosophy.

*10B. Visitation of Schools. (G.E.) Assistant Professor DRESSLAR.

3 hrs., first half-year—1 unit. Prerequisite: At least Junior standing; Course 2 in Philosophy. Course 10B may be taken only in conjunction with Course 10A.

*11A. Seminary for the Study of Children. (G.E.) Assistant Professor DRESSLAR.

2 hrs., first half-year. Th., 2:00–4:00. Primarily for Graduates.

11B. Seminary for the Study of Children. (G.E.) Assistant Professor DRESSLAR.

2 hrs., second half-year. Th., 2:00–4:00. Primarily for Graduates. 11B may be elected in addition to 11A without repetition of subject-matter. 11A or 11B may be elected separately.

12. School Hygiene. (G.E.) Assistant Professor DRESSLAR.

Lectures and readings.

2 hrs., second half-year. Section I, M., F., 8:00; Section II, S., 8:00–10:00. Prerequisite: At least Junior standing.

*Not to be given in 1901-02.

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*13A. Studies in Secondary Education. (G.E.) Professor BROWN.
Lectures and readings.
3 hrs., second half-year. M., W., F., 10:00. Prerequisite: Course 5.

13B. Visitation of Secondary Schools. (G.E.) Dr. MOORE.
1 hr., second half-year. One half-day a week. Admission on consultation with the instructor in charge.

13C. Visitation of Secondary Schools. (G.E.) Dr. MOORE.
1 hr., first half-year. One half-day a week. Admission on consultation with the instructor in charge.

15. Special Studies. (G.E.) Assistant Professor DRESSLAR.
Either half-year. M., 4:00–6:00. Primarily for Graduates. Credit value and topics to be arranged with individual students.

16. Selected Topics in the Theory and Practice of Education. (G.E.) Assistant Professor DRESSLAR.
Lectures and readings.
2 hrs., first half-year. M., F., 8:00. Prerequisite: Course 5 or 10A.

17. The Educational Theory of Herbart. (G.E.) Dr. MOORE.
Lectures and readings.
2 hrs., first half-year. Tu., Th., 3:00. Prerequisite: Course 2 in Philosophy.

18. Studies in Educational Method. (G.E.) Dr. MOORE.
Lectures and readings.
2 hrs., second half-year. Tu., Th., 3:00. Prerequisite: Course 2 in Philosophy.

19A. Seminary for the Study of Mental Development. (G.E.) Dr. MOORE.
2 hrs., first half-year. Tu., Th., 2:00. Primarily for Graduates. Prerequisite: Course 2 in Philosophy.

19B. Seminary for the Study of Mental Development. (G.E.) Dr. MOORE.
2 hrs., second half-year. Tu., Th., 2:00. Primarily for Graduates. Prerequisite: Course 19A.

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JURISPRUDENCE.

WILLIAM CAREY JONES, M.A., Professor of Jurisprudence.

CURTIS H. LINDLEY, Honorary Professor of the Law of Mines and Water.

GEORGE H. BOKE, M.A., Instructor in Jurisprudence.

WILLIAM H. GORRILL, M.A., LL.B., Instructor in Law.

LOUIS T. HENGSTLER, M.A., Ph.D., Lecturer in Law.

WILLIAM B. BOSLEY, A.B., LL.B., Lecturer in Law.

WARREN OLNEY, JR., A.B., LL.B., Lecturer in Law.

The undergraduate courses in general are designed with a three-fold aim in view: (1) to subserve the purpose of a liberal education; (2) to lay a foundation for the historical and theoretical, and also the professional study of the law; (3) to supply the legal elements of the education contemplated by the College of Commerce.

Course 10 is introductory and prerequisite to all other courses. At least Sophomore standing is required.

English 12B, Old English Laws, together with English 5, and Latin 21, Juristic Latin, may be included in the Group Elective in Jurisprudence.

Course 16, besides its value to the student of law, is designed to be of special benefit to students in the Colleges of Mining and Agriculture.

Course 18 is specially designed for the needs of students in the College of Commerce, but it is of value also to the professional student of law in making him directly acquainted with the application of the law to some of the principal phases of business.

10. Elementary Law and Jurisprudence. Mr. BOKE.

An exposition of the main principles underlying the Common Law in the light of jurisprudence.

2 hrs., throughout the year. Tu., Th., 10:00.

11. The Law of Property. (G.E.) Mr. BOSLEY.

2 hrs., throughout the year. Tu., Th., 8:00. Prerequisite: Senior standing.

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12. The Law of Torts. (G.E.) Mr. GORRILL.
2 hrs., throughout the year. Tu., Th., 11:00. Prerequisite: Senior standing.

13. The Law of Crimes. (G.E.) Mr. BOKE.
2 hrs., throughout the year. Tu., Th., 9:00. Prerequisite: Senior standing.

15. The Law of Contracts. (G.E.) Mr. BOKE.
3 hrs., throughout the year. M., W., F., 8:00. Prerequisite: Senior standing.

19. Common Law Pleading. Mr. GORRILL.
1 hr., throughout the year. S., 8:00. Prerequisite: At least Senior standing.

5. Roman Law. (G.E.) Professor JONES.
3 hrs., first half-year. M., W., F., 9:00. Prerequisite: At least Junior standing. Required for the Group Elective in Jurisprudence.

*14. Administrative Law. (G.E.) Mr. BOKE.
2 hrs., throughout the year. Prerequisite: At least Junior standing.

16. The Public Lands: Mines and Water. (G.E.)
Professor LINDLEY.
1 hr., throughout the year. W., 4:00. Prerequisite: Senior standing.

*1. Formation of the Federal Constitution. (G.E.)
Professor JONES.
1 hr., either half-year. Prerequisite: Any two courses in History and Political Science.

2. Constitutional Law of the United States. (G.E.)
Professor JONES.
3 hrs., throughout the year. M., W., F., 10:00. Prerequisite: Senior standing.

3. Principles of International Law. (G.E.) Mr. BOKE.
2 hrs., throughout the year. Tu., Th., 8:00. Prerequisite: At least Junior standing.

*6. Studies in Comparative Law. Professor JONES.
2 hrs., throughout the year. Prerequisite: Graduate standing.

*Not to be given in 1901–02.

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7. **Principles of Jurisprudence.** Professor JONES.

3 hrs., second half-year. M., W., F., 9:00. Prerequisite: At least Junior standing.

*18. **Commercial Law.** Dr. HENGSTLER.

2 hrs., throughout the year. Tu., Th., 4:00. Prerequisite: At least Junior standing.

20. **Agency and Partnership.** Mr. GORRILL.

2 hrs., throughout the year. M., W., 9:00. Prerequisite: Graduate standing.

21. **The Law of Evidence.** Mr. OLNEY.

2 hrs., throughout the year. Tu., Th., 8:00. Prerequisite: Graduate standing.

22. **Principles of Equity.** Mr. GORRILL.

2 hrs., throughout the year. M., W., 8:00. Prerequisite: Graduate standing.

23. **The Law of Bills and Notes.** Professor JONES.

2 hrs., first half-year. M., W., 11:00. Prerequisite: Graduate standing.

24. **The Law of Sales.** Professor JONES.

2 hrs., second half-year. M., W., 11:00. Prerequisite: Graduate standing.

*25. **The Law of Corporations.** Dr. HENGSTLER.

2 hrs., throughout the year. Tu., Th., 4:00. Prerequisite: Graduate standing.

Graduate standing implies that the student has credit for Courses 11, 12, 13, 15, 19.

Students intending to follow the profession of the law are advised to take, in their Sophomore year, Course 10; in their Junior year, Courses 5, 19, and such of Courses 3, 7, 18 as they are able to take.

The following courses are required by law schools of good standing for the degree of LL.B.: 2, 11, 12, 13, 15, 19, 20, 21, 22, 23, 24, 25.

Students who intend to take any courses of the department with a view to professional preparation should, in all cases, first consult the instructors of the department.

Those students who have commenced their legal work according to a plan which does not adapt itself to the foregoing scheme of courses, must consult the department for arrangement of their future plan of study.

* Either 18 or 25 will be given in 1901-02, according to demand.

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HISTORY AND POLITICAL SCIENCE.

*Bernard Moses, Ph.D., Professor of History and Political Economy.

Thomas R. Bacon, A.B., B.D., Professor of Modern European History.

——— ———, Professor of Finance and Economics.

Carl C. Plehn, Ph.D., Associate Professor of Finance.

Kendric C. Babcock, Ph.D., Assistant Professor of History and Political Science.

Thomas W. Page, Ph.D., Assistant Professor of History and Economics.

George B. Wakeman, Ph.D., Instructor in History.

William S. Ferguson, Ph.D., Instructor in Grecian and Roman History.

Lincoln Hutchinson, M.A., Instructor in Commercial Geography.

Gaillard T. Lapsley, Ph.D., Instructor in History.

Charles E. Fryer, Ph.B., Reader in History.

Group Elective. Prerequisite, for students in the Colleges of Social and Natural Sciences, any five courses. For students in the College of Letters, any three courses.

PRIMARILY FOR FIRST-YEAR STUDENTS.

51. Introduction to Economics.

Assistant Professor Page and Mr. Hutchinson.

A study of the elementary laws of economics as illustrated in the growth of industry and commerce; the influence of economic conditions on social and political development.

3 hrs., either half-year. First half-year: Two sections, M., W., F., 1:00. Second half-year: Two sections, M., W., F., 2:00.

52. The Political History of England.

Dr. Wakeman and Dr. Lapsley.

An outline of the history of England from the earliest times, introductory to the study of constitutional government.

*Absent on leave, 1901-02.

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3 hrs., either half-year. First half-year: Two sections, M., W., F., 2:00. Second half-year: Two sections, M., W., F., 1:00.

53. History of Greece. Dr. FERGUSON.

From the earliest times till the death of Alexander the Great. A lecture course illustrated by lantern slides. The attempt is made to trace the artistic, intellectual, religious, social, and economic, as well as political development of the Greek people.

3 hrs., first half-year. M., W., F., 3:00. Text-book, J. B. Bury's History of Greece.

54. History of Rome. Dr. FERGUSON.

From the earliest times till the death of Julius Cæsar. A lecture course treating of the rise, expansion, and downfall of the Roman Republic.

3 hrs., second half-year. M., W., F., 3:00. Text-book, How & Leigh's History of Rome.

FOR STUDENTS OF MORE ADVANCED STANDING.

(The year in which these courses may be taken is determined by the prerequisites.)

*55. Latin-American Colonization. Professor MOSES.

Spanish settlement and administration during the Colonial Period; the War of Independence; the political development of the Spanish-American republics.

3 hrs., second half-year. Prerequisite: Any two courses.

56. The French Revolution. Professor BACON.

The history of Europe from 1789 to 1815.

3 hrs., first half-year. M., W., F., 10:00. Prerequisite: Any one of the Freshman courses.

57. Europe in the Nineteenth Century. Professor BACON.

The political history of continental Europe from 1815 to the present time.

3 hrs., second half-year. M., W., F., 10:00. Prerequisite: Course 56.

58A. General Commercial History since 1763. Assistant Professor PAGE.

2 hrs., second half-year. M., W., F., 2:00.

* Not to be given in 1901–02.

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59. **Constitutional History of England to 1485.** Dr. WAKEMAN.

A study of the beginnings of constitutional government in England, and of how the English people learned to govern themselves.

3 hrs., first half-year. M., W., F., 1:00. Prerequisite: Two courses in History, including Course 52.

60. **History of Modern England from 1485.** Dr. WAKEMAN.

A study of the development of the constitution, and of the upbuilding of the British Empire; how the English learned to govern other peoples.

3 hrs., second half-year. M., W., F., 2:00. Prerequisite: Course 59.

61. **Greek Institutions.** Dr. FERGUSON.

The origin and working of the mechanism of government in typical oligarchic, democratic, federal, and monarchical states. International relations. The Greek theory of government.

2 hrs., first half-year. Tu., Th., 1:00. Prerequisite: Courses 53 and 81.

62. **History of Rome.** Dr. FERGUSON.

From the death of Julius Cæsar till the death of Marcus Aurelius. In this course particular attention is paid to the social, economic, and religious condition of the people.

3 hrs., second half-year. M., W., F., 1:00. Prerequisite: Course 54.

62A. **History of Rome.** Dr. FERGUSON.

From the death of Marcus Aurelius till the accession of Odoacer. The disintegration of the Roman Empire and the decline of the culture of antiquity.

2 hrs., second half-year. Tu., Th., 1:00. Prequisite: Courses 54 and 62.

63. **Theoretical Economics.** Associate Professor PLEHN.

A general survey of the principles and laws of economic science.

3 hrs., first half-year. M., W., F., 3:00. Prerequisite: Course 51.

63A. **Practical Economics.** Associate Professor PLEHN.

Discussions of money, banking, credit, prices, trusts, monoplies, etc.

3 hrs., second half-year. M., W., F., 3:00.

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64. **The Beginning of the Middle Ages.**
Mr. HUTCHINSON and Dr. LAPSLEY.
The Germanic invasions and the establishment of the empire of Charles the Great.
2 hrs., throughout the year. Tu., Th., 10:00. Prerequisite: Any three courses in history.

65. **Germany in the Middle Ages.** (G.E.) Dr. LAPSLEY.
A study of its institutions, with a critical examination of the origin, organization, and influence of the Holy Roman empire.
3 hrs., second half-year. M., W., F., 2:00. Prerequisite: Two courses, including 64 (or 9B), and a reading knowledge of Latin or German.

66. **The History of Mediæval France.** Dr. LAPSLEY.
A study of the evolution of the French Monarchy, with the growth of its institutions from the earliest times.
2 hrs., first half-year. Tu., Th., 9:00. Prerequisite: Any two courses, and a reading knowledge of Latin or French.

67. **Comparative Constitutional Law.** Professor BACON.
A comparative view of the development and present condition of the political institutions of the western nations.
3 hrs., first half-year. M., W., F., 9:00. Prerequisite: Any two courses.

68A. **Eastern Europe.** Professor BACON.
A study of the rise and development of Russia, and its relations with other nations in Europe and Asia.
2 hrs., second half-year. Tu., Th., 9:00. Prerequisite: Any five courses.

69. **Western Civilization in its Economic Aspects.**
Mr. HUTCHINSON.
3 hrs., second half-year. M., W., F., 9:00. Prerequisite: Course 51.

71. **History of the United States since 1850.**
Assistant Professor BABCOCK.
A study of the overthrow of the slave power, the civil war, reconstruction, and the development of the resources of the country.
3 hrs., second half-year. M., W., F., 2:00. Prerequisite: Course 72 or 73 and two other courses.

* Not to be given in 1901–02.

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72. English Colonies in America. Assistant Professor BABCOCK.

A detailed study of colonial institutions and progress to the formation of the Constitution.

3 hrs., first half-year. M., W., F., 9:00. Prerequisite: One course in history, excluding 51.

*73. The United States under the Constitution, 1783-1850. Assistant Professor BABCOCK.

With special emphasis on the constitutional and social development.

3 hrs., second half-year. M., W., F., 9:00. Prerequisite: Two courses in history and at least Sophomore standing.

74. Local Government and Administration, with Special Reference to Municipal Problems. Assistant Professor BABCOCK.

3 hrs., second half-year. M., W., F., 2:00. Prerequisite: Four courses, including 72 or 73.

75. Economic and Social History of the English Colonies in America, 1607-1776. Assistant Professor PAGE.

2 hrs., first half-year. Tu., Th., 2:00. Prerequisite: Course 72.

76. Economic History of the United States, 1776-1890. Assistant Professor PAGE.

3 hrs., second half-year. M., W., F., 2:00. Prerequisite: Courses 63, and 73 or 86.

77. Economic History from 1763. Associate Professor PLEHN.

A review of economic policies and tendencies from the Peace of Paris to the present time.

3 hrs., second half-year. Prerequisite: Courses 51 and 63 with one other.

77A. English Economic History. Assistant Professor PAGE.

3 hrs., first half-year. M., W., F., 2:00. Prerequisite: Courses 51 and 52.

78. History of the Political Theories of the Eighteenth Century. Assistant Professor BABCOCK.

A history of the political theories which influenced the institutions and revolutions of the eighteenth century.

2 hrs., first half-year. Tu., Th., 9:00. Prerequisite: The same as for the Group Elective.

* Not to be given in 1901-02.

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79. British Control of Asiatic Dependencies. Dr. WAKEMAN.

A study of the rise and growth of British power in India, the Straits Settlements, and Hong Kong, in its political and administrative phases.

2 hrs., first half-year. Tu., Th., 9:00. Prerequisite: Any five courses.

80. Territorial Expansion of the United States. Dr. WAKEMAN.

The settlement and political organization of Louisiana, Florida, Texas, and the region west of the Rocky Mountains, with a view of the events leading up to the several territorial accessions to the United States since 1783.

2 hrs., second half-year. Prerequisite: Course 72 or 73.

81. History of Greece. Dr. FERGUSON.

From the death of Alexander the Great till the death of Cleopatra. A history of the Greek people under federal and monarchical institutions; the spread of Greek culture in the East; the oriental reaction, the transition from Greece to Rome, and the decline of Greece.

3 hrs., first half-year. M., W., F., 2:00. Prerequisite: Course 53. Text-book, Adolf Holm's History of Greece, vol. iv.

83. Public Finance. Associate Professor PLEHN.

Leading problems of modern finance theoretically and historically considered, especial attention being given to taxation. Lectures and discussion.

3 hrs., second half-year. M., W., F., 2:00. Prerequisite: Course 63.

*84. Economic Theory. Professor MOSES.

A critical examination of the theories of leading writers since Adam Smith, with special reference to the problem of distribution.

2 hrs., second half-year. Tu., Th., 2:00. Prerequisite: The same as for the Group Elective.

86. Diplomatic History of the United States. Assistant Professor BABCOCK.

A study of the negotiations, treaties, arbitrations, and congresses in which the United States has been a party, 1776-1900.

3 hrs., first half-year. M., W., F., 1:00. Prerequisite: Any four courses, including Course 71 or 73.

*Not to be given in 1901-02.

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87. **The Renaissance and Reformation.** (G.E.) Professor BACON.

The transition from mediæval to modern history.

3 hrs., second half-year. M., W., F., 10:00. Prerequisite: Any five courses in history.

*88. **Theories of Social Progress.** (G.E.) Professor MOSES.

A critical examination of the theories hitherto offered to explain the forces, methods, and aims of social progress.

2 hrs., first half-year. Prerequisite: The same as for the Group Elective.

*89. **Political Science.** (G.E.) Professor MOSES.

A course of graduate study in the science of Politics, including the history of political thought since the middle of the eighteenth century.

2 hrs., second half-year.

90. **Banking and Currency.** (G.E.) Associate Professor PLEHN.

History, practice, and theory.

3 hrs., first half-year. M., W., F., 2:00. Prerequisite: Course 63.

91. **Statistics.** (G.E.) Associate Professor PLEHN.

The history, theory, and methods of statistics, as applied to economic investigation, to insurance, and similar problems.

2 hrs., first half-year. Tu., Th., 11:00. Prerequisite: The same as for the Group Elective. Course 20A in Mathematics must be taken in conjunction with this course.

102. **The Art and Meaning of History.** Professor BACON.

A review of the progress of historical writing from the earliest times to the present; with an examination of the various attempts to interpret the deeper meanings of history, commonly called the philosophy of history.

2 hrs., first half-year. Tu., Th., 9:00. Prerequisite: Twenty hours in History and Political Science. (Courses in jurisprudence may be substituted in part for the prerequisite.)

103. **History of California.** Assistant Professor BABCOCK.

A discussion of the salient features of the settlement, conquest, and development of the State of California, with a critical examination of some of the sources.

2 hrs., second half-year. Tu., Th., 9:00. Prerequisite: Three courses in history, including 71, 72, or 73.

*Not to be given in 1901–02.

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104. **The Teaching of History.** Assistant Professor BABCOCK.

A discussion of the teaching of history in secondary schools, with special emphasis on the methods, courses, and materials. The course is designed primarily for those expecting to apply for a high school teacher's certificate in history.

1 hr., second half-year. S., 9:00. Prerequisite: Six courses, and at least senior standing.

105. **History of Mediæval Law.** Dr. LAPSLEY.

A review of the development of legal institutions and principles in western Europe from the time of the Germanic invasions to the revival of Roman law.

2 hrs., first half-year. Tu., Th., 10:00. Prerequisite: Fifteen hours in History, Economics or Jurisprudence, and a reading knowledge of French or German.

FOR GRADUATE STUDENTS.

70. **History of America's Commercial Policy, 1789–1890.** Assistant Professor PAGE.

2 hrs., throughout the year.

82. **Greek Epigraphy.** Dr. FERGUSON.

The history of the Greek alphabet and the interpretation of the more important inscriptions of the Hellenistic period.

2 hrs., first half-year. Text-book, Dittenberger's Sylloge Inscriptionum Græcarum.

92. **Investigation Course in the History of the United States.** Assistant Professor BABCOCK.

A course in original research upon assigned topics, with weekly conferences.

2 hrs., throughout the year.

*93. **History of the Christian Church.** Professor BACON.

The spread of Christianity, and the doctrine and polity of the Church.

2 hrs., throughout the year.

94. **History of Eastern Christendom.** Professor BACON.

A critical study of the political, social, and religious institutions of the Eastern Christian nations.

2 hrs., throughout the year.

*Not to be given in 1901–02.

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95. **Federal Expenditures, Revenues, and Debts.**
Associate Professor PLEHN.
2 hrs., throughout the year.

*96. **Industrial and Commercial History of the United States.**
Associate Professor PLEHN.
2 hrs., throughout the year.

*97. **Currency and Banking.** Associate Professor PLEHN.
2 hrs., throughout the year.

*98. **Economic Condition of Laborers in England.** Professor MOSES.
An historical and critical view of trade unions, economic legislation, and industrial progress, and their effects on the welfare of laborers.
2 hrs., first half-year. Tu., Th., 11:15.

*99. **The Public Domain.** Assistant Professor PAGE.
Its management, settlement, and influence on the economic development of the United States.
2 hrs., throughout the year.

100. **Economic Aspects of the Renaissance.** Mr. HUTCHINSON.
2 hrs., throughout the year.

101. **Special Study of a Period of Greek History.** Dr. FERGUSON.
The Athenian Empire.
2 hrs., second half-year. Text-book, G. F. Hill's Sources for Greek History.

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*Not to be given in 1901–02.

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LINGUISTICS.

BENJ. IDE WHEELER, Ph.D., LL.D., President of the University.

1. **General Introduction to the Science of Language.**

Dr. WHEELER.

The essential principles of the life and growth of language; outlines of the science of phonetics; history of the science of comparative philology; historical and ethnological results of the science; classification of languages; salient characteristics of the various branches of the Indo-European family of languages; methods of investigation.

Tu., Th., 9:00. A course intended for prospective teachers of languages; open to Seniors and Graduates.

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SEMITIC LANGUAGES AND LITERATURES.

JACOB VOORSANGER, D.D., Professor of the Semitic Languages and Literatures.

MAX L. MARGOLIS, Ph.D., Associate Professor of the Semitic Languages.

SEMITIC LANGUAGES IN GENERAL.

1. General Introduction to the Study of the Semitic Languages. (G.E.) Professor VOORSANGER.

Lectures on the nature and classification of the Semitic languages, and a general survey of the history and literatures of the Semites.

2 hrs., throughout the year. Tu., 1:00–3:00.

*2. Comparative Grammar of the Semitic Languages. Associate Professor MARGOLIS.

Semitic phonology.

1 hr., throughout the year. Tu., 4:00. Primarily for Graduates.

*2A. Comparative Grammar of the Semitic Languages. Associate Professor MARGOLIS.

Semitic morphology.

1 hr., throughout the year. Tu., 4:00. Primarily for Graduates.

COURSES IN BIBLICAL HEBREW AND ARCHAEOLOGY.

3. Elementary Course. (G.E.) Associate Professor MARGOLIS.

A study of Hebrew morphology and of the most important points of syntax in connection with graded readings from the Old Testament. Text-books: Hebrew Bible, ed. Hahn; Gesenius's Hebrew Lexicon, ed. Brown-Briggs-Driver.

3 hrs., throughout the year. W., 2:00–4:00; Th., 9:00. Prerequisite: At least Junior standing.

*Not to be given in 1901–02.

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4. **Second Course.** (G.E.) Associate Professor MARGOLIS.

Continued reading of selected chapters in the Old Testament. Text-book: Gesenius-Kautzsch Hebrew Grammar, Clarendon Press.

3 hrs., first half-year. W., 8:00–10:00; Th., 8:00. Prerequisite: At least Senior standing.

6B. **Third Course.** Associate Professor MARGOLIS.

A thorough study of certain paragraphs of Gesenius-Kautzsch; exercises in reading unpointed texts and in translation from English into Hebrew.

2 hrs., first half-year. Tu., 10:00–12:00. Primarily for Graduates.

*6C. **Exegetical Course.** Associate Professor MARGOLIS.

Critical interpretation of the book of Amos. Lectures illustrating the method and apparatus of Old Testament exegesis.

2 hrs., throughout the year. Tu., 8:00–10:00. Primarily for Graduates.

7. **Exegetical Course.** Professor VOORSANGER.

Critical interpretation of Jeremiah, ch. 11–20.

2 hrs., throughout the year. Tu., 9:00–11:00. Primarily for Graduates.

*7A. **Biblical Archaeology.** (G.E.) Professor VOORSANGER.

Lectures on the languages, customs, civil institutions, religions, etc., of the nations and peoples of the Old Testament, with especial reference to the historical development of the religious and political institutions of the Jewish people.

2 hrs., throughout the year. Tu., 1:00–3:00. Open to all students of the University.

COURSES IN RABBINICAL HEBREW.

8. **The Mishna.** Professor VOORSANGER.

Reading of the treatise Taanith, preceded by a general introduction to Rabbinic literature.

1 hr., first half-year. Tu., 11:00. Primarily for Graduates.

9. **Selected Readings from the Jewish Exegetical Writings of the Middle Ages.** Professor VOORSANGER.

1 hr., second half-year. Tu., 11:00. Primarily for Graduates.

*Not to be given in 1901–02.

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COURSES IN ARAMAIC AND SYRIAC.

10. **Introductory Course.** Associate Professor MARGOLIS.

Selections from the Aramaic portions of the Old Testament; Genesis, ch. 1–4 in the Targum and Peshita. Text-books: Strack, Grammatik des Biblischen Aramaisch, second edition; Merx, Chrestomathia Targumica; Nestle, Syriac Grammar.

3 hrs., second half-year. W., 8:00–10:00; Th., 8:00. Primarily for Graduates.

11. **Advanced Course.** Associate Professor MARGOLIS.

Interpretation of Roediger's Chrestomathia Syriaca, with references to Nöldeke's Syrische Grammatik.

2 hrs., throughout the year. W., 10:00–12:00. Primarily for Graduates.

12. **Third Course.** Associate Professor MARGOLIS.

Interpretation of the seventh and eighth chapters of Berakhoth, Palestinian Talmud. Text-books: Dalman, Grammatik des jüdisch-palästinischen Aramäisch; Strack, Einleitung in den Thalmud; Mielziner, Introduction to the Talmud.

2 hrs., second half-year. Tu., 10:00–12:00. Primarily for Graduates.

COURSES IN ARABIC AND ETHIOPIC.

*13. **Arabic.** Associate Professor MARGOLIS.

Introductory course. Acquisition of a sufficiently large vocabulary; a study of the morphology. Text-book: Socin's Arabic Grammar.

2 hrs., throughout the year. Tu., 9:00; Th., 2:00. Primarily for Graduates.

14. **Arabic.** Associate Professor MARGOLIS.

Advanced course. Interpretation of Brünnow's Chrestomathy of Arabic Prose Pieces, with special attention to syntax and references to Wright's Arabic Grammar.

2 hrs., throughout the year. Tu., 8:00–10:00. Primarily for Graduates.

*15. **Arabic.** Associate Professor MARGOLIS.

Third course. First half-year: Interpretation of selected portions of Baidhawi's Commentary on the Koran. Second half-year: Interpretation of the Muallakat (ed. Abel).

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2 hrs., throughout the year. Primarily for Graduates.

*16. Ethiopic. Assistant Professor MARGOLIS.

Praetorius, Aethiopische Grammatik.

1 hr., throughout the year. Primarily for Graduates.

COURSES IN ASSYRIAN.

*17. Elementary Course. Associate Professor MARGOLIS.

Selected inscriptions in Abel und Winckler's Keilschrifttexte zum Gebrauch bei Vorlesungen, on the basis of Delitzsch's Assyrian Grammar and Assyrisches Handwörterbuch.

1 hr., throughout the year. Primarily for Graduates.

18. Advanced Course. Associate Professor MARGOLIS.

Interpretation of mythological and epical texts.

2 hrs., throughout the year. Tu., 2:00–4:00. Primarily for Graduates.

SEMITIC EPIGRAPHY.

*19. Phœnician Inscriptions. Associate Professor MARGOLIS.

Interpretation of selected Phœnician inscriptions, preceded by a history of the alphabet.

1 hr., second half-year. Primarily for Graduates.

GENERAL LINGUISTICS.

21. The Relationship of the Indo-European, Semitic, and Egyptian Families of Languages. (G.E.)

Associate Professor MARGOLIS.

The criteria of the affinity of languages. Agglutinative inflection: the structure of the Indo-European languages. Internal inflection: the structure of the Semitic languages. The Egyptian language. The three groups compared in regard to grammar, phonetic development, and vocabulary.

1 hr., throughout the year. Tu., 4:00. Primarily for Graduates. Knowledge of a Semitic language is not required. Familiarity with one classical language is essential. The course is particularly recommended to students intending to become teachers of classical or modern languages.

*Not to be given in 1901–02.

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IN CONJUNCTION WITH THE GREEK DEPARTMENT.

20. **The Septuagint.** (G.E.) Associate Professor MARGOLIS.

(Also announced as Greek 35.) History of the Septuagint and of its text. The Septuagint dialect and its relation to classical Greek on the one hand, and to New Testament Greek on the other. Reading of the Book of Daniel in the third volume of Swete's Old Testament in Greek.

1 hr., throughout the year. W., 4:00. Prerequisite: At least Junior standing.

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ORIENTAL LANGUAGES AND LITERATURES.

JOHN FRYER, LL.D., Agassiz Professor of Oriental Languages and Literatures.

W. N. FONG, A.B., Chinese Assistant.

Y. KUNO, M.S., Japanese Assistant.

In addition to the lecture and language courses given below, Professor Fryer will offer assistance to students who wish to take up other branches of study connected with China and Japan. He will also act as adviser to students coming from or going to the Orient.

Some of these Group Elective courses are accepted by the College of Commerce and other colleges as part of the regular curriculum or as substitutes for prescribed work. Graduates and undergraduates wishing to take up these Oriental studies, may therefore find it to their advantage to consult with the Dean of their college as to the arrangements that can be made in this direction.

LECTURE COURSES.

FOR GRADUATES AND UNDERGRADUATES.

1. **The History, Languages, and Literatures of China and Japan.** (G.E.) Professor FRYER.

A course of lectures adapted for students in general as well as for those who look forward to relations with the Orient.

3 hrs., first half-year. M., W., F., 4:00.

11. **The Laws, Government, and Social Condition of China and Japan.** (G.E.) Professor FRYER.

A course of lectures adapted for students in general as well as for those who look forward to relations with the Orient.

3 hrs., second half-year. M., W., F., 4:00.

1A. **The Commerce of China and Japan.** (G.E.) Professor FRYER.

A course of lectures on the historical and geographical features of the commerce of China and Japan, adapted for students in general but particularly for those in the College of Commerce.

3 hrs., first half-year. M., W., F., 1:00.

11A. **The Commerce of China and Japan.** (G.E.) Professor FRYER.

A course of lectures on the economic and political features of the

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commerce of China and Japan, adapted for students in general but particularly for those in the College of Commerce.

3 hrs., second half-year. M., W., F., 1:00.

*2. The Philosophies and Religions of China. (G.E.) Professor FRYER.

A course of lectures on Confucianism and Taoism, adapted for students in general as well as for those who look forward to relations with the Orient.

3 hrs., first half-year. M., W., F., 4:00.

*12. The Philosophies and Religions of China. (G.E.) Professor FRYER.

A course of lectures on Buddhism, Mohammedanism, and other religions in China, adapted for students in general as well as for those who look forward to relations with the Orient.

3 hrs., second half-year. M., W., F., 4:00.

*12A. The Philosophies and Religions of Japan. (G.E.) Professor FRYER.

A course of lectures on the principal religions and philosophies of Ancient and Modern Japan, adapted for students in general as well as for those who look forward to relations with the Orient.

3 hrs., first half-year. M., W., F., 4:00.

2A. Chinese Classical Literature. (G.E.) Professor FRYER.

A critical study of selections from English translations of the principal classical books of China.

1 hr., throughout the year. M., 11:00. Prerequisite: Senior standing.

LANGUAGE COURSES.

FOR GRADUATES AND UNDERGRADUATES.

3. Elementary Study of Kuan-hua. (G.E.) Professor FRYER.

Introduction to Kuan-hua, the language spoken by the officials and about four-fifths of the population of China. Series of progressive elementary lessons and exercises in reading, speaking, translation, and composition.

3 hrs., throughout the year. M., W., F., 10:00.

4. Advanced Study of Kuan-hua. (G.E.) Professor FRYER.

Series of progressive advanced lessons and exercises in reading, speaking, translation, and composition. Selections from Kuan-hua literature.

* Not to be given in 1901–02.

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3 hrs., throughout the year. M., W., F., 9:00. Prerequisite: Course 3.

5. **Elementary Study of Wen-li.** (G.E.) Professor FRYER.

The classical written language of the empires of China and Japan. Progressive selections from various kinds of current literature and official documents, with exercises in translation and composition. Selections from the Four Books.

3 hrs., throughout the year. M., W., F., 3:00. Prerequisite: Course 4, 8, or 10.

6. **Advanced Study of Wen-li.** (G.E.) Professor FRYER.

Progressive selections from the higher classical literature, with exercises in translation and composition. Selections from the Five Classics, essays, technical books, and poetry.

3 hrs., throughout the year. Prerequisite: Course 5.

7. **Elementary Study of the Cantonese Dialect.** (G.E.) Mr. FONG.

Introduction to Cantonese, the dialect spoken by the greater part of the Chinese who emigrate to America, Australia, and other countries. Series of progressive elementary lessons and exercises in speaking, reading, translation, and composition.

3 hrs., throughout the year. M., W., F., 9:00.

8. **Advanced Study of the Cantonese Dialect.** (G.E.) Mr. FONG.

Series of progressive advanced lessons and exercises in speaking, reading, translation, and composition. Selections from literature in the Cantonese dialect.

3 hrs., throughout the year. Prerequisite: Course 7.

9. **Elementary Study of the Japanese Language.** (G.E.) Mr. KUNO.

Introduction to the Japanese language, with the use of both the Katakana and Hiragana forms of letters. Series of progressive elementary lessons and exercises in reading, speaking, and writing.

3 hrs., throughout the year. M., W., F., 8:00.

10. **Advanced Study of the Japanese Language.** (G.E.) Mr. KUNO.

Series of progressive advanced lessons and exercises in reading, speaking, translation, and composition, with selections from the best Japanese literature.

3 hrs., throughout the year. M., W., Th., 11:00. Prerequisite: Course 9.

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GREEK.

EDWARD B. CLAPP, Ph.D., Professor of the Greek Language and Literature.

ISAAC FLAGG, Ph.D., Associate Professor of Greek.

JAMES T. ALLEN, Ph.D., Instructor in Greek and Classical Archaeology.

WILLIAM S. FERGUSON, Ph.D., Instructor in Grecian and Roman History.

Courses 2 and 1A are prescribed, in the Freshman year, to students in the College of Letters. But specially competent students may be assigned to Course 1 in place of Course 1A. Course 1 is also elective, when taken in addition to other work in Greek, to students who wish to devote more than one half-year to Homer. In this course, the entire Iliad and Odyssey are read in four successive years.

The Group Elective. Prerequisite to the Group Elective are: Courses 1A (or 1), 2, and any one of Courses 7A, 9A, and 11. The other two of the last named three courses (after one of them has been taken) may be included in the Group Elective. Students who desire to take the whole of their Group Elective in Greek may include in the Group courses in Sanskrit, Greek Philosophy, and Greek History.

Teachers' Certificates. Students will be recommended for teachers' certificates who, at graduation, or after, shall have completed with credit Course 6B, together with twelve units of work selected from Courses 20 to 39 in Greek. Graduate students will be recommended on proof of having creditably completed work equal in extent to that required of undergraduates.

Homer Club. This is a voluntary organization of undergraduates, limited to ten in number, for the purpose of sight translation in Homer. The Club meets for one hour every Monday evening, under the leadership of Dr. Allen. No University credit is given for the work.

PRESCRIBED COURSES.

2. Lysias. Professor CLAPP and Dr. ALLEN.

This course is intended to carry forward the student's training in the vocabulary, syntax, and style of model Attic prose, without, however, neglecting the historical and legal questions involved in the study of this author.

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3 hrs., first half-year. M., W., F. Section I, 8:00; II, 9:00; III, 1:00.

1A. **Homer's Iliad—Books xix–xxiv.** Dr. ALLEN.

In this course much attention is given to accurate translation and correct metrical reading of the Greek. Seymour's Introduction to the Language and Verse of Homer is studied in connection with the text.

3 hrs., second half-year. M., W., F. Section I, 8:00; II, 9:00.

1. **Homer.** Associate Professor FLAGG.

Rapid reading, with intensive study of selected passages. Written tests in translation at sight. In 1901-02, the Iliad.

3 hrs., second half-year. M., W., F., 8:00. Prerequisite: First or second grade of scholarship in Course 2.

ELECTIVE COURSES.

3C. **The Writing of Attic Prose.** Dr. ALLEN.

Exercises in writing Greek at hearing, and in prose composition, based mainly upon Xenophon.

1 hr., first half-year. S., 9:00. An elective course, designed for those who intend to continue their Greek studies beyond the prescribed minimum. Open to intrants whose preparation is not sufficient to enable them to take Course 4A the first year.

3D. **The Writing of Attic Prose.** Dr. ALLEN.

A continuation of Course 3C.

1 hr., second half-year. S., 9:00. Prerequisite: Creditable standing in 3C.

4A. **The Writing of Attic Prose.** Associate Professor FLAGG.

1 hr., first half-year. S., 9:00. Open to intrants, upon passing a special examination for admission to the course; and to others, upon completion of Course 3D with creditable standing.

6B. **The Writing of Attic Prose.** Associate Professor FLAGG.

Translations from Latin into Greek.

1 hr., second half-year. S., 9:00. Prerequisite: Course 4A.

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9B. The Philippics of Demosthenes. (G.E.)* Dr. ALLEN.

With special attention to the study of Attic prose, and the history of Greek oratory.

3 hrs., first half-year. M., W., F., 10:00. Prerequisite: Course 1A (or 1) and 2.

11. Herodotus. (G.E.)* Associate Professor FLAGG.

Rapid reading. Written tests in translation at sight.

3 hrs., first half-year. M., W., F., 8:00. Prerequisite: First or second grade of scholarship in 1A or 1.

7A. Introduction to Greek Tragedy. (G.E.)† Professor CLAPP.

The Alcestis of Euripides, and the Prometheus of Aeschylus, with practice in the intelligent reading of the trimeters and anapaests. In connection with this course a series of informal lectures will be given, on the representation of Greek dramas, and on the artistic form and structure of Greek Tragedy.

3 hrs., second half-year. M., W., F., 10:00. Prerequisite: Courses 1A (or 1) and 2.

16. Studies in Greek Literature. Associate Professor FLAGG.

(*a*) The classical Greek poetry. To be given in 1901–02 if elected by at least twenty-five students.

‡(*b*) The classical Greek prose.

Informal lectures, adapted to meet the wants both of classical students and of those who have no Greek. Characteristic literary forms and such authors as have largely influenced the world's literature are examined with some minuteness of detail; while others, not of universal significance, are left unnoticed, or treated with the utmost brevity. Illustrative passages are presented in translation.

1 hr., throughout the year. Tu., 11:00. Open to the University.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES.

The following more advanced courses are open to graduates, and to undergraduates who have completed at least three of Courses 1, 1A, 2, 7A, 9A, 11 (if Course 7A is not one of the three, it must be taken with the first advanced course chosen), and such other preliminary work as may be called for in the statements under the several courses.

* May be included in the Group Elective only if preceded by Course 7A.

† May be included in the Group Elective only if preceded by Course 9A, or 11.

‡ Not to be given in 1901–02.

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23. **The Oration of Demosthenes on the Crown.** (G.E.) Professor CLAPP.

With special reference to the historical and political questions involved, and to the orator's method of argumentation.

2 hrs., first half-year. Tu., Th., 9:00.

27. **The Electra of Sophocles.** (G.E.) Associate Professor FLAGG.

2 hrs., first half-year. Tu., Th., 10:00. Special prerequisite: Course 4A.

31C. **Greek Historical Prose.** (G.E.) Associate Professor FLAGG.

Rapid reading, with frequent written tests in translation at sight.

3 hrs., first half-year. M., W., F., 9:00.

22B. **Aeschylus.** (G.E.) Dr. ALLEN.

The Agamemnon.

2 hrs., second half-year. Tu., Th., 11:00. Permission to take this course must be secured from the instructor in advance. The class will be limited to ten members. Prerequisite: The completion of Course 7A and at least one other course in Greek Tragedy.

24. **The Seventh Book of Thucydides.** (G.E.) Professor CLAPP.

Historical and topographical study of the siege of Syracuse, with some attention to the peculiarities of the style and language of Thucydides.

2 hrs., second half-year. Tu., Th., 9:00.

31D. **Greek Historical Prose.** (G.E.) Associate Professor FLAGG.

Rapid reading, with frequent written tests in translation at sight.

3 hrs., second half-year. M., W., F., 9:00.

37B. **The Knights of Aristophanes.** (G.E.) Associate Professor FLAGG.

2 hrs., second half-year. Tu., Th., 10:00. Special prerequisite: Course 4A.

38. **Greek Syntax.** (G.E.) Dr. ALLEN.

A discussion of problems of general syntax, followed by a survey of the syntax of the Greek moods and tenses, based mainly upon Homer. Lectures, with collateral reading and investigation of special topics. Members of the class should be provided with a complete text of the Iliad and the Odyssey. The text of Dindorf-Hentze is recommended.

2 hrs., second half-year. Tu., Th., 1:00. Prerequisite: At least Senior standing, and the completion of Course 6B.

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The Septuagint [Semitic 20]. (G.E.)

Associate Professor MARGOLIS.

History of the Septuagint and its text. Grammatical and lexical peculiarities. Selected readings from the historical, prophetical, and poetical books. (Swete's The Old Testament in Greek, three vols., Cambridge.)

1 hr., throughout the year. W., 4:00.

GREEK HISTORY AND INSCRIPTIONS.

The following courses in Greek History and Inscriptions, given under the supervision of the Department of History and Political Science, are of special importance to students of Greek. For details, prerequisites, etc., see under History.

HISTORY.

53. History of Greece to the Death of Alexander the Great.

Dr. FERGUSON.

3 hrs., first half-year. M., W., F., 3:00.

61. Greek Institutions. Dr. FERGUSON.

2 hrs., first half-year. Tu., Th., 1:00.

81. History of Greece from the Death of Alexander the Great.

Dr. FERGUSON.

3 hrs., first half-year. M., W., F., 2:00.

82. Greek Epigraphy. (G.E.) Dr. FERGUSON.

2 hrs., first half-year. Hours to be arranged. Primarily for Graduates.

101. Special Study of a Period of Greek History. Dr. FERGUSON.

The Athenian Empire.

2 hrs., second half-year. Hours to be arranged. Primarily for Graduates.

CLASSICAL ARCHAEOLOGY.

Courses in Classical Archaeology are open to all students of the University. Courses 41A and 41B are designed as an introduction to the study of art.

41A. Introduction to Greek and Roman Sculpture. (G.E.)

Dr. ALLEN.

A course of lectures upon the history of Classical Sculpture, with special attention to the characteristics of successive periods as reflecting contemporary national life and thought.

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2 hrs., first half-year. Tu., Th., 1:00. Prerequisite: At least Sophomore standing.

41B. **Introduction to Classical Architecture.** (G.E.) Dr. ALLEN.

A course of lectures upon the history of Classical Architecture from the Mycenaean Era to the fifth century A.D.

1 hr., second half-year. F., 1:00. Prerequisite: At least Sophomore standing.

*43A. **Topography and Monuments of Ancient Athens.** (G.E.) Dr. ALLEN.

1 hr., second half-year. F., 1:00.

43B. **Topography and Monuments of Ancient Rome.** (G.E.) Dr. ALLEN.

2 hrs., first half-year. Tu., Th., 1:00.

COURSES FOR GRADUATES.

The following courses are intended for graduate students only, and one or more of them will be given each year, according to the needs of students. Many graduate students will find it profitable to take also some of the advanced courses for undergraduates (Courses 20 to 49).

52. **The Odes of Pindar.** Professor CLAPP.

In this course it is expected that each student, so far as possible, will thoroughly read and master the extant odes of the poet; will make himself familiar with their metrical structure and peculiarities, and will gain an acquaintance, at first hand, with the chief questions, textual, historical, and literary, which are involved in the study. Special investigation of important topics will be carried on by the students individually, leading to the preparation of original papers.

4 hrs., throughout the year. Tu., 4:00–6:00; S., 8:30–10:30.

†51. **The Republic of Plato.** Professor CLAPP.

Textual criticism and interpretation, but with some consideration of the philosophy of Plato.

4 hrs., throughout the year. Given in 1900–01.

†53. **The Extant Dramas of Aeschylus.** Professor CLAPP.

4 hrs., throughout the year. Given in 1899–1900.

For additional graduate courses in Greek, see History 82 and 101.

*Not to be given in 1901–02, but in the year following.

†Not to be given in 1901–02.

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LATIN.

WILLIAM A. MERRILL, Ph.D., Professor of the Latin Language and Literature.

MARTIN KELLOGG, LL.D., Emeritus Professor of Latin.

LEON J. RICHARDSON, A.B., Assistant Professor of Latin.

HERBERT C. NUTTING, Ph.D., Instructor in Latin.

STANLEY SIMONDS, Ph.D., Instructor in Latin.

HENRY W. PRESCOTT Ph.D., Instructor in Latin.

JOHN W. BASORE, Ph.D., Instructor in Latin.

I. M. LINFORTH, A.B., Assistant in Latin.

——— ———, Reader in Latin.

The Latin work of the first and second years normally is continuous, and no part of it intended to count for prescribed work should be postponed by regular students to later years of residence. Courses 3 to 11, inclusive, may be counted for the prescribed or free elective work in the Colleges of General Culture, and as a free elective in other colleges, subject to their regulations. Four courses, and no more, may be selected from Courses 5 to 11; and they may not be taken in conjunction with, nor subsequent to, Courses 12 to 60.

The Group Elective. Course 4 is prerequisite to the Group Elective in Latin. [After August, 1903, six units of German, six units of French, and History, Course 64; and after August, 1904, a course in the History of Philosophy will also be required.] At least six units of Greek, and History, Course 62, are also strongly recommended. The completed Group Elective must, after August, 1902, include Course 12, and should show an acquaintance from Latin sources with the condition of the language before Cicero and after Augustus; and the authors selected should represent equally poetry and prose. Group Elective schedules, when determined upon, should be submitted to the head of the department for criticism.

Teachers' Certificates. The requirements for recommendation by the department are graduation with the Group Elective in Latin, which in the College of Social Sciences must include at least twelve units of work in Latin when Latin is grouped with another subject; and in the College of Letters at least nine units. Graduate students

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who pursue the study of Latin in, and graduate from, this University, will be recommended on proof of having completed, with credit, work equal in value and scope to that demanded of undergraduates.

PRELIMINARY COURSES.

A. Cicero's Orations; Virgil's Aeneid. Dr. BASORE.

5 hrs., throughout the year; 3 units each half-year. M., Tu., W., Th., F., 1:00. Prerequisite: Matriculation subject 6*a*. May be counted for free elective work only, in all colleges, subject to their regulations. As a year course it may not be divided. It is identical with matriculation subject 7*a*.

B. Latin Composition. Dr. BASORE.

1 hr., throughout the year; ½ unit each half-year. S., 11:00. Prerequisite: Matriculation subject 6*b*. May be counted for free elective work only, in all colleges, subject to their regulations. As a year course it may not be divided. It is identical with matriculation subject 7*b*.

1. Cicero and Pliny.

Dr. NUTTING, Dr. PRESCOTT, Dr. SIMONDS, and Dr. BASORE.

The Cato Maior of Cicero and the Letters of Pliny. Systematic study of syntax and synonyms. Practice in reading aloud and in translation at hearing; careful attention to pronunciation, phrasing, and emphasis.

3 hrs., either half-year. First half-year, six sections. M., W., F., 8:00, 10:00, 2:00, 3:00; Tu., Th., S., 8:00, 9:00. Second half-year, one section. Tu., Th., S., 10:00.

Prerequisite: Subject seven *(a)* of the admission requirements, or Course A. Prescribed in the College of Letters. May be counted for prescribed or free elective work in the Colleges of Social and Natural Sciences, and as a free elective in other colleges, subject to their regulations.

1B. Sight Translation. Dr. PRESCOTT.

Practice in reading at sight from easy authors with incidental interpretation.

1 hr., throughout the year—½ unit each half-year. Tu., 11:00. Prerequisite: Contemporary registration in Course 1 or 2. This course may be counted for prescribed or free elective work at the option of the student.

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2. **Livy and Plautus.**

Dr. NUTTING, Dr. PRESCOTT, DR. SIMONDS, and Dr. BASORE.

Selections from Livy, and rapid reading of one play of Plautus.

3 hrs., either half-year. First half-year, one section. Tu., Th., S., 10:00. Second half-year, six sections. M., W., F., 8:00, 10:00, 2:00, 3:00; Tu., Th., S., 8:00, 9:00. Prerequisite: Course 1. Prescribed in the College of Letters; may be counted for prescribed or free elective work in the Colleges of Social and Natural Sciences, and as a free elective in other colleges, subject to their regulations.

3. **Latin Composition, I.** Dr. NUTTING.

Exercises in writing Latin prose narrative.

1 hr., throughout the year. Four sections. Th., 11:00, 2:00, 3:00, 4:00. Prerequisite: Subject seven *(b)* of the admission requirements, or Course B.

4. **Latin Composition, II.** Dr. PRESCOTT.

Writing Latin in periodic style. Retranslation of English versions of Latin and Greek authors and of selections from English classic writers.

1 hr., throughout the year. Three sections. Tu., 1:00, 2:00, 3:00. Prerequisite: Satisfactory completion of Course 3. Prerequisite for the Group Elective in Latin, and required of all candidates for teachers' certificates in Latin.

5. **Horace and Virgil.**

Professor KELLOGG, Assistant Professor RICHARDSON, Dr. PRESCOTT, and DR. SIMONDS.

The Odes and Epodes of Horace. Private reading of selections from Virgil's Æneid, vii–xii.

3 hrs., first half-year. Four sections. M., W., F., 9:00, 2:00, 3:00. Tu., Th., S., 9:00. Prerequisite: Course 2, completed, or in progress.

6. **Terence; Sallust.** Professor KELLOGG.

Two plays of Terence; Sallust, Catiline, for private reading.

2 hrs., second half-year. M., W., 2:00. Prerequisite: Course 5.

8. **Cicero, Letters; Roman Literature.**

Assistant Professor RICHARDSON.

Select letters of Cicero. Mackail's Roman Literature.

2 hrs., second half-year. Tu., Th. 9:00. Prerequisite: Course 5.

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9. Catullus; Ovid. Dr. PRESCOTT.

Selections from Catullus; Ovid's Heroides for private reading.

2 hrs., second half-year. M., W., 3:00. Prerequisite: Course 5.

10. Horace, Satires and Epistles. Dr. SIMONDS.

A course in rapid reading.

2 hrs., second half-year. M., W., 9:00. Prerequisite: Course 5.

ADVANCED COURSES FOR UNDERGRADUATES.

Prerequisite: One course selected from Courses 6 to 11.

12. Latin Composition, III. (G.E.)
Assistant Professor RICHARDSON.

Extended idiom; translation of English masterpieces. Training in Latin expression and construction.

1 hr., throughout the year. Tu., 3:00. Additional prerequisite: Satisfactory completion of Course 4.

13. Latin Composition, IV. (G.E.)
Assistant Professor RICHARDSON.

Translation into Latin prose from models of exposition and argumentation. Original Latin essays.

1 hr., throughout the year. Th., 3:00. Additional prerequisite: Satisfactory completion of Course 12.

14E. Cicero: De Officiis. (G.E.) Professor MERRILL.

Lecture course, with translation and exegesis.

1 hr., second half-year. Tu., 11:00.

17. Virgil's Georgics. (G.E.) Assistant Professor RICHARDSON.

Metrical reading, translation, and exegesis.

2 hrs., first half-year. Tu., Th., 2:00.

18. Tacitus, Histories; Suetonius. (G.E.) Professor KELLOGG.

Selections from the Histories of Tacitus, and the Galba, Otho, and Vitellius of Suetonius.

2 hrs., first half-year. Tu., Th., 11:00.

19. Patristic Latin. (G.E.) Professor MERRILL.

St. Augustine, De civitate Dei, and the Hymn Writers, with particular reference to the language.

3 hrs., first half-year. M., W., F., 10:00.

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24. **Early Latin.** (G.E.) Professor MERRILL.

A selection of inscriptions, together with the fragments of the early literature. Independent interpretation of 50 titles from the Corpus Inscriptionum.

3 hrs., second half-year. M., W., F., 10:00.

25B. **Lucretius.** (G.E.) Dr. SIMONDS.

Criticism and interpretation of the poem and outline of the Epicurean system.

3 hrs., first half-year. M., W., F., 8:00.

26. **Quintilian, Books x and xii.** (G.E.) Professor KELLOGG.

Literary criticism among the Romans.

2 hrs., second half-year. Tu., Th., 11:00.

29. **Roman Oratory.** (G.E.) Assistant Professor RICHARDSON.

The De Oratore together with a survey of Cicero's other oratorical writings, and those of Quintilian and Tacitus.

3 hrs., first half-year. Tu., Th., S., 8:00.

31. **Roman Satire.** (G.E.) Dr. SIMONDS.

Lectures on the history of Roman Satire, with translation and exegesis of selected satires from Ennius to Juvenal.

3 hrs., second half-year. M., W., F., 8:00.

32. **Bucolic Poetry.** (G.E.) Dr. SIMONDS.

The Bucolics of Virgil, and the Idylls of Theocritus in Greek.

2 hrs., first half-year. M., W., 4:00.

35. **Teachers' Training Course.** Assistant Professor RICHARDSON.

Problems in teaching Latin; estimates of text-books; visiting of local schools. Examination of questions in pronunciation and syntax; exercises in teaching preparatory authors.

3 hrs., second half-year. Tu., Th., S., 8:00. Additional prerequisite: Senior or Graduate standing.

39. **Roman Comedy.** (G.E.) Dr. PRESCOTT.

Selected plays of Plautus and Terence with some attention to the place of comedy in Roman Literature. Critical study of versification, language, and syntax.

3 hrs., throughout the year. M., W., F., 2:00.

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40A. **Latin Grammar: Forms; Syntax of the Noun.** (G.E.)
Dr. NUTTING.

A study of the forms of the Latin language, based on a text-book; lectures on the syntax of the cases. [Important for prospective teachers.]

2 hrs., first half-year. M., W., 1:00. Additional prerequisite: Course 4.

40B. **Latin Grammar: Syntax of the Verb.** (G.E.) Dr. NUTTING.

A survey of some of the important problems of Latin syntax. Lectures and individual work.

2 hrs., second half-year. M., W., 1:00. Additional prerequisite: Course 4.

49. **Sight Translation.** (G.E.) Professor MERRILL.

Exercises in translating at sight selections from the prose literature of the Empire. Work confined to lecture-room.

3 hrs., first half-year—1 unit. M., W., 11:00; F., 4:00.

53. **Roman Private Life.** (G.E.) Assistant Professor RICHARDSON.

A lecture course illustrated from the survivals of ancient plastic art. Collateral reading.

2 hrs., second half-year. Tu., Th., 1:00.

54. **Roman Topography.** (G.E.) Dr. SIMONDS.

Topography and monuments of Ancient Rome. Lectures.

2 hrs., second half-year. M., W., 4:00.

56. **Roman Tragedy.** (G.E.) Professor MERRILL.

A brief survey of the development of Roman Tragedy, and reading of Seneca's Tragedies, with some attention to his Greek sources and his influence on modern literature.

3 hrs, second half-year. M., W., 11:00; F., 4:00.

57. **Mediaeval Latin.** (G.E.) Professor MERRILL.

Reading of selected historical and ecclesiastical documents illustrating Latin literary style in the middle ages.

1 hr., first half-year. Th., 11:00.

58. **Cicero, Pro Cluentio.** (G.E.) Professor KELLOGG.

Introduction to Roman legal procedure.

2 hrs., second half-year. Tu., Th., 10:00.

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COURSES FOR GRADUATES.

25A. **Cicero, De Natura Deorum.** Professor KELLOGG.

Criticism and interpretation.

3 hrs., second half-year. M., W., F., 3:00.

30. **Latin Verse Composition.** Assistant Professor RICHARDSON.

Latin hexameters, elegiacs, sapphics, asclepiads, and alcaics.

1 hr., throughout the year. W., 3:00.

34. **Latin Seminary.** Professor MERRILL.

Criticism and interpretation of Lucretius. Exercises in diplomatic criticism; treatment of grammatical, philosophical, and literary subjects suggested by the Latin text. The entire poem will be read privately.

3 hrs., throughout the year. Th., 4:00; S., 10:00–12:00. Required of all candidates for higher degrees who make Latin their major subject.

47. **Metric.** Assistant Professor RICHARDSON.

Studies in Greek and Latin verse forms. Lectures.

1 hr., first half-year. W., 4:00.

51. **Cicero: Tusculan Disputations.** Professor KELLOGG.

Criticism and interpretation.

3 hrs., first half-year. M., W., F., 3:00.

SANSKRIT.

65. **Elementary Sanskrit.** Dr. SIMONDS.

Perry's Primer, and Lanman's Reader.

2 hrs., throughout the year. Tu., Th., 3:00.

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ENGLISH.

CHARLES M. GAYLEY, Litt.D., LL.D., Professor of the English Language and Literature.

*CORNELIUS B. BRADLEY, M.A., Professor of Rhetoric.

ALEXIS F. LANGE, Ph.D., Associate Professor of English and Scandinavian Philology.

LOUIS DU PONT SYLE, M.A., Associate Professor of English Literature.

WILLIAM D. ARMES, M.L., Assistant Professor of English Literature.

THOMAS F. SANFORD, A.B., Assistant Professor of English Literature.

CHAUNCEY W. WELLS, A.B., Assistant Professor of English Composition.

MARTIN C. FLAHERTY, Ph.B., Instructor in Argumentation.

GEORGE R. NOYES, Ph.D., Instructor in English and Russian.

——— ———, Instructor in the Art of Speaking.

DE WINTER, M.A., Assistant in English Composition.

ROGER S. PHELPS, M.A., Assistant in English Philology.

RALPH E. GIBBS, M.S., Reader in English.

Regular students who undertake the work of this department must have credit for entrance English A, and 1 or 14, and special students must have credit for all three requirements. Courses 1, 2A, and 2B must, ordinarily, precede all advanced courses. Course 1 fulfils the prescription for the College of Letters. Courses 1, 2A, and 2B, or Courses 1, 2A, and 3B or 4 or 5 fulfil the prescription for the Colleges of Social Sciences and Natural Sciences. Course 3A and four units taken from Courses 3B, 3C, 4, 6, 7, and 8 fulfil the prescription for the College of Commerce. Courses 3, 4, and 6A are especially adapted to the needs of students in the Colleges of Applied Science.

The Group Elective. Prerequisite to the Group Elective are: (*a*) The completion of Courses 1, 2A, 2B, and 5 (but students in the College of Letters who present twelve units of University credit in Latin and twelve in Greek may substitute 3B or 4, for 2B); and (*b*) an

*Absent on leave, 1901–02.

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effective acquaintance with at least two foreign languages—one of which should be the Latin or the Greek. [After August, 1902, this requirement will be twelve units of University credit in each language offered.] Students whose Group Elective lies entirely in English must include in their lists at least two courses under the heading Rhetoric, Composition, and Speaking, one under the heading Criticism, one under Philology, and under the heading Historical and Critical Study of Literature at least one course on a period, type, or movement, and one on an author. All courses, unless otherwise specified, are open as Free Electives in all the colleges, subject only to the proper sequence of studies.

Teachers' Certificates. Courses 9A, 10, 13, 14, 17A, 21A, and 34 are designed especially for students who desire to teach, but they are open only to those who have had the English courses prescribed in the various colleges. For the Teachers' Certificate students must include in their lists 3C or its equivalent; the prerequisites to the Group; two courses under the heading Rhetoric, Composition, and Speaking; 8A or 8B or its equivalent and another course; one course under Criticism; under Philology, 13, and one part of 12 or of 14; and one course under the Study of Literature.

Students, however, who are making the Group Elective in Economics and Politics may substitute 7A, 7B, and 7C, for 5 and 12 or 14. Candidates for the certificate in English must have University credit for twelve units in each of the following studies: Latin or Greek, German or French, and Philosophy or History.

PRELIMINARY COURSES.

1. General History of English Literature.

Assistant Professors ARMES and SANFORD, Mr. FLAHERTY, and Dr. NOYES.

The development of our literature from the Beowulf to the time of Wordsworth; by the study of representative specimens, with lectures explanatory of their historical connection. Exercises in composition conducted by Mr. WINTER.

3 hrs., throughout the year. Nine sections. M., W., F., 8:00, 9:00, 10:00, 2:00; Tu., Th., S., 8:00, 9:00, 10:00. This course must precede all others, except Course 3A.

1A. General History of English Literature.

Assistant Professor SANFORD.

Identical with Course 1.

3 hrs., throughout the year, beginning second half-year. M., W., F., 3:00.

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2. English Prose. Associate Professor SYLE, Assistant Professor ———, and Mr. PHELPS.

Training in composition based upon a study of the typical kinds of prose, and of illustrative masterpieces.

A. Exposition.

3 hrs., first half-year. Seven sections. M., W., F., 9:00, 10:00, 1:00, 2:00, 3:00; Tu., Th., S., 9:00, 10:00.

B. Narration and Description.

3 hrs., second half-year. Six sections. M., W., F., 8:00, 9:00, 10:00, 11:00, 2:00; Tu., Th., S., 9:00.

3A. Practical Composition. Assistant Professor ——— and Mr. WINTER.

Frequent exercises in the writing of correct, concise, and effective English; the preparation of abstracts and reports; training in exposition and description, and in business correspondence.

1 hr., throughout the year. As many sections as may be necessary. M. or W., 4:00. Open to all students as Free Elective. Prescribed in the College of Commerce. Required (but without credit) of students who have not credit for entrance Subject A.

3B. General Composition. Mr. WINTER.

1 hr., each half-year. Open to students who have passed Course 1 or 2A or 3A, as Free Elective or as fulfilling prescribed units in English.

3C. Practice in Reading and Speaking. Mr. ———.

Exercises in enunciation and expression; the reading and delivery of short extracts from masterpieces of prose and verse.

2 hrs., throughout the year. To be arranged. Free Elective. No prerequisite. This course is required of all prospective teachers unless they are excused by the instructor on examination. (No University credit.)

4. Great Books. Professor GAYLEY.

A discussion of certain foreign masterpieces in their bearing upon English literature. Lectures, reading, and reports.

1 hr., second half-year. Tu., 4:00. Intended especially for students in the Colleges of Applied Science and Commerce. Open to other students only after they have passed Course 1. It may then be taken as Free Elective, or as optional with 2B to complete the hours prescribed.

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5. **Old English.** Associate Professor LANGE and Mr. PHELPS.

Grammar; reading of selected prose and poetry.

3 hrs., each half-year. Three sections. Section I, first half-year, M., W., F., 9:00. Sections II and III, second half-year, M., W., F., 8:00, 9:00. Prerequisite: Sophomore standing; for Section I, also the consent of Associate Professor LANGE.

ADVANCED COURSES.

A.—PRIMARILY FOR JUNIORS AND SENIORS.

RHETORIC, COMPOSITION, AND SPEAKING.

6. **Composition under Individual Training and Direction.** (G.E.)

A. Exercises based upon the scientific prose of the nineteenth century; selections from some of the following: Darwin, Wallace, Tyndall, Huxley, Mill, Spencer. Associate Professor SYLE.

3 hrs., first half-year. M., W., F., 2:00. Open only to students who have shown distinct ability in Course 2 or 3B, and have the permission of the instructor.

B. The technical and practical study of simple types of literary composition. Assistant Professor ——— and Mr. WINTER.

1 hr., throughout the year. Two sections. Open only to students who have attained first grade in Course 2 or 3B, and who have permission from the instructor to take the course.

7A. **Argumentation.** Mr. FLAHERTY and Mr. ———.

Preparation of briefs; delivery of arguments.

3 hrs., first half-year. Th., debate, 4:00; supervision of briefs, ———. Prerequisite: Courses 1, 2A, 2B (or its equivalent) and 3C in English, and the prerequisites to the Group in Economics and Politics.

7B. **Forensics.** Mr. FLAHERTY and Mr. ———.

Practice in debating and training in delivery.

3 hrs., second half-year. W., 2:00–5:00. Open only to students selected from the class in Argumentation.

7C. **Oral Debates upon Literary Topics.** Professor GAYLEY and Mr. ———.

Training in the literary and stylistic features of argumentative discourse; the discussion of moot-questions in the criticism of Shakespeare's plays and other masterpieces.

2 hrs., first half-year. Th., 2:00–4:00. Open to men who have taken 7A and 7B.

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*7D. **Masterpieces of Argumentation.** (G.E.) Mr. FLAHERTY.

2 hrs., throughout the year.

7E. **Advanced Studies in Rhetoric and Composition.** (G.E.) Assistant Professor ———.

2 hrs., each half-year. Tu., Th., 1:00. Prerequisite: 2A and 2B.

8A. **Masterpieces of Oratory.** Mr. ———.

Analysis of thought, order, and style, with exercises in the memorization and delivery of classic orations.

2 hrs., throughout the year. To be arranged. Open to students who have taken the prescribed courses in English, and Course 3C.

8B. **Preparation and Delivery of Speeches.** Mr. ———.

2 hrs., each half-year. To be arranged. Prerequisite: Course 8A, or its equivalent.

THE THEORY, HISTORY, AND PRACTICE OF CRITICISM.

*9A. **The Theory of Poetry.** (G.E.) Professor GAYLEY.

Lectures on poetry in its relation to the other arts: versification. Reports on Aristotle's Poetics, Lessing's Laocoön, Freytag's Technique of the Drama, etc.

2 hrs., first half-year, 1902–03. Tu., Th., 11:00. Prerequisite: Courses 1 and 2.

9B. **Problems in Literary Criticism.** (G.E.) Professor GAYLEY.

The characteristics and development of literary types (in 1899–1900, Lyric, Ballad, and Idyll; in 1901–02, Epic, Romance, and Novel). Seminar.

4 hrs., first half-year 1901–02; second half-year 1902–03. Tu., 2:00–4:00; F., 9:00–11:00. This course will not be required for Group Elective or Teachers' Certificate. In 1901–02 it will be included in Course 32, and will be open only to Graduates and to those Seniors who have passed Course 9A (1900–01) with first grade, and who have the requisite knowledge of foreign languages.

*9C. **The History of English Criticism.** Professor GAYLEY.

Periods of development; special study of influences in theory and method, and of the pivotal masterpieces.

*Not to be given in 1901–02; to be given in 1902–03.

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10. **Interpretation: Logical and Literary.** (G.E.)
Associate Professor LANGE.

Principles and methods; study of representative masterpieces; practical exercises, oral and written.

3 hrs., second half-year; M., W., F., 10:00. Prerequisite: At least Junior standing.

*11A. **Germanic Sources of English Life and Culture.** (G.E.)
Associate Professor LANGE.

Topical study and lectures.

3 hrs., first half-year. M., W., F., 9:00.

11B. **Norse Mythology.** Associate Professor LANGE.

Lectures and topical study.

3 hrs., second half-year. M., W., 11:00; F., 1:00. Prerequisite: At least Junior standing.

PHILOLOGY.

12A. **Beowulf.** (G.E.) Associate Professor LANGE.

A critical study of the poem; investigation of special topics pertaining to the Germanic element in English life and culture.

3 hrs., second half-year. M., W., F., 9:00.

†12B. **Old English Laws.** (G.E.) Associate Professor LANGE.

Sources, characteric features, and cultural aspects. Translation and collateral reading.

2 hrs., second half-year.

13. **Chaucer.** (G.E.) Associate Professor LANGE.

A minute study of selected tales and poems; the life and thought of his times.

3 hrs., first half-year. M., W., F., 10:00.

†14. **English Grammar.** (G.E.) Professor BRADLEY.

A systematic discussion, with application of the historical and comparative method; critical examination of one or more text-books, with reference to their adaptation to use in the schools.

3 hrs., first half-year. M., W., F., 8:00. Prerequisite: Course 5, and a thorough acquaintance with some such elementary work as Whitney's Essentials of English Grammar.

* May not be given in 1901–02.

† Not to be given in 1901–02; to be given in 1902–03.

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14A. History of the English Language. (G.E.) Mr. PHELPS.

The origin and growth of the English tongue, with special reference to phonology and accidence.

3 hrs., first half-year. M., W., F., 8:00.

THE HISTORICAL AND CRITICAL STUDY OF LITERATURE.

15A. Elizabethan Poetry. (G.E.) Assistant Professor SANFORD.

Lectures on the development of lyric, pastoral, sonnet, madrigal, ode, elegy, and epithalamium (1550–1660) from their classical and renaissance sources.

3 hrs., second half-year. M., W., F., 9:00. Prerequisite: At least Course 1 and the first half-year of Sophomore English.

15B. Spenser. (G.E.) Assistant Professor SANFORD.

The development of the literary epic in Virgil, Dante, Ariosto, and Tasso, with special reference to Spenser.

3 hrs., first half-year. M., W., F., 9:00.

*16A. Elizabethan Prose. Assistant Professor SANFORD.

Lectures on the history and development of prose literature from 1550 to 1625.

3 hrs., second half-year. M., W., F., 9:00. Prerequisite as for 15A. Courses 16A and 16B alternate with Courses 15A and 15B.

*16B. Elizabethan Prose Authors. Assistant Professor SANFORD.

Intensive study of the romancers.

17A. The Contemporaries of Shakespeare. (G.E.) Professor GAYLEY.

A method of dramatic criticism. Lectures. Reading of representative plays. 2 hrs., first half-year, 1901–02; second half-year, 1902–03. Tu., Th., 11:00. Prerequisite: At least Senior standing.

17B. Shakespeare. (G.E.) Professor GAYLEY.

His personality and the development of his method. Historical criticism of selected works. Seminar.

2 hrs., second half-year, 1901–02. Tu., Th., 2:00–4:00. Open to those Seniors who have completed the prerequisites of the Group Elective, and have shown especial ability in Course 17A; also to Graduates.

* Not to be given in 1901–02; to be given in 1902–03.

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18A. Seventeenth Century Prose. (G.E.) Dr. NOYES.

Lectures and general discussion of representative authors; special study of Bacon, Bunyan, Dryden, Hobbes, or Locke.

3 hrs., second half-year. To be arranged. Prerequisite as for 15A.

*18B. Milton. (G.E.) Professor BRADLEY.

His life and times. Lectures.

2 hrs., first half-year. Tu., Th., 8:00. Prerequisite: At least Junior standing.

*18C. Milton. (G.E.) Professor BRADLEY.

His poetry and selections from his prose. Seminar.

3 hrs., second half-year. M., W., F., 10:00. Open to those only who have shown especial ability in Course 18A.

*19A. English Prose Writers of the Eighteenth Century. (G.E.) Associate Professor SYLE.

A general outline, with intensive study of Swift, Defoe, Addison, Johnson, Hume, or Burke.

3 hrs., first half-year. M., W., F., 2:00. Prerequisite: As for Course 15A.

*19B. Eighteenth Century Poets and Dramatists. (G.E.) Associate Professor SYLE.

From Pope to Goldsmith. Rapid outline, with intensive study of one or more or the representative authors.

3 hrs., second half-year. W., 1:00-3:00; F., 2:00.

21A. History of Poetry in the Nineteenth Century. (G.E.) Professor GAYLEY.

Lectures; reading and reports.

2 hrs., second half-year 1901-02; first half-year 1903-04. Tu., Th., 11:00. Prerequisite: Courses 1 and 2 and at least Junior standing.

*21B. Poems of the Nineteenth Century. (G.E.) Professor GAYLEY.

Intensive study of selected masterpieces of Wordsworth, Tennyson, Arnold, Browning, and other poets. Seminar.

3 hrs., first half-year 1902-03. Open to those Seniors who have completed the prerequisites to the Group Elective, and have shown especial ability in Course 20A; also to Graduates.

* Not to be given in 1901-02; to be given in 1902-03.

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22A. **The History of American Literature.** (G.E.)
Assistant Professor ARMES.

A general view, illustrated by copious reading; lectures, reports, and discussions.

3 hrs., first half-year. M., W., F., 10:00. Prerequisite: As for Course 15A.

22B. **American Authors.** (G.E.) Assistant Professor ARMES.

Intensive study of special authors. (In 1900–01: The Poetry of Longfellow, Whittier, Emerson, Lowell, and Holmes.)

3 hrs., second half-year. M., W., F., 10:00.

*23A. **The Drama: Its Origin and Development.**
Assistant Professor ARMES.

Lectures, with collateral reading, on the classical, mediæval, and English dramas.

3 hrs., first half-year. M., W., F., 10:00. Prerequisite: At least Course 1 and the first half-year of Sophomore English.

*23B. **Problems in the History of the English Drama.** (G.E.)
Assistant Professor ARMES.

Investigation of special questions; presentation of results, and discussion.

3 hrs., second half-year. M., W., F., 10:00. Prerequisite: As for 15B. Courses 23A and 23B will alternate every two years with 22A and 22B.

24. **The Novel.** (G.E.) Dr. NOYES.

The development of the type in England, with a study of representative specimens.

3 hrs., first half-year. To be arranged. Prerequisite: The courses prescribed for the various colleges.

25. **Representative Essayists.** (G.E.) Associate Professor SYLE.

In 1901–02, Matthew Arnold's critical works.

3 hrs., second half-year. M., W., F., 2:00. Prerequisite: The prescribed courses and at least Junior standing.

B.—FOR GRADUATES.

30. **Old Norse.** Associate Professor LANGE.

Outline of the grammar; readings. The relations of Old Icelandic to Gothic and Old English.

*Not to be given in 1901–02; to be given in 1902–03.

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3 hrs., first half-year. M., W., 11:00; F., 1:00. Prerequisite. Course 5, and, if possible, a knowledge of Gothic. This course may, in exceptional cases, be taken by Seniors.

31. Special Studies in English Philology.
Associate Professor LANGE.

(*a*) Phonology—First Modern English. (Given in 1896–97–98.)

(*b*) Philological interpretation and criticism—The Shoemakers' Holiday and Fortunatus, by Thomas Dekker. (Given in 1899.)

(*c*) A course to be announced later.

2 hrs., first half-year. Hours to be arranged with the instructor.

*32. The Influence of Germany on English Literature of the Eighteenth and Ninteenth Centuries. Associate Professor LANGE.

(*a*) Goethe and Carlyle.

2 hrs., throughout the year.

34. Seminar in Method. Associate Professor LANGE.

English in the University and the High School. An enquiry into aims, materials, and methods of study and instruction.

2 hrs., second half-year. To be arranged. In exceptional cases this course may be taken by Seniors.

*35. The Mediæval Spirit in Literature and Art.
Professor BRADLEY.

(*a*) Its historical basis and development. (Given in 1897–98.)

(*b*) Its embodiment in mediæval literature and art. (In 1898–99.)

(*c*) Its modern revivals in English literature.

3 hrs., throughout the year.

*36. The Essay. Professor BRADLEY.

Its historical development and a study of some of its perfected types in English literature. In 1899–1900, Elizabethan Prose.

2 hrs., throughout the year. In exceptional cases this course may be taken by Seniors.

38. The Revolt Against Classicism. Assistant Professor SANFORD.

The romantic, naturalistic, and sentimental movement in England in the eighteenth and nineteenth centuries, with incidental reference to the similar movement on the Continent.

*Not to be given in 1901–02; to be given in 1902–03.

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2 hrs., throughout the year. M., F., 2:00. Prerequisite: Courses 15A and 15B and a sufficient acquaintance with the French and German languages and literatures.

*40. The History of Æsthetic. Professor GAYLEY.

From a study at first hand of the principal authorities.

3 hrs., throughout the year. This course should be preceded by Course 9A or 9B.

41. English Comedy. Professor GAYLEY.

The careful investigation of one or two problems in its development.

4 hrs., second half-year. This course should be preceded by Courses 17A and 17B.

42. Comparative Literature. Professor GAYLEY.

The origins of poetry; special study of the development of one or more of the literary types.

4 hrs., first half-year. Tu., 2:00–4:00; F., 9:00–11:00. This course should be preceded by 9A and 40.

50. Special Study.

The instructors in English hold themselves ready to assist and advise competent students who may propose plans of special study which meet the approval of the department.

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*To be given in 1902–03.

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GERMAN.

HUGO KARL SCHILLING, Ph.D., Professor of the German Language and Literature.

ALBIN PUTZKER, M.A., Professor of German Literature.

J. HENRY SENGER, Ph.D., Associate Professor of German.

CHARLES R. KEYES, M.A., Instructor in German.

MARTIN A. M. CENTNER, A.B., Instructor in German.

MICHAEL ONGERTH, Grad. Theol. Univ. of Vienna, Reader.

All students are advised to take Courses 2, 4, and 5. There will be opportunities for conversational practice. The work in the advanced courses will be carried on mainly in German.

The Group Elective. Prerequisite are Courses 1 or 1A, and 2 or 3. The Group Elective must include Course 7.

Teachers' Certificates. Students who speak and write German correctly, and who desire the recommendation for the Teachers' Certificate, should make German their Group Elective and include in their lists Courses 8, 9, and 12.

PRELIMINARY COURSES.

PRIMARILY FOR FRESHMEN AND SOPHOMORES.

1. **Introductory German.** MR. KEYES and Mr. CENTNER.

The Joynes-Meissner German Grammar; select readings. The course includes the essentials of German grammar, with copious exercises in composition; translation at hearing; reading in German; question and answer in German, etc.

3 hrs., throughout the year. M., W., F., 8:00, 9:00, 10:00, 1:00; Tu., Th., S., 8:00.

1A. **German Prose.** Mr. CENTNER.

A progressive reading course, with frequent exercises in composition, translation at hearing, and sight reading. It is intended for students who have had two years of German in the secondary schools, or who have passed the entrance examination in Subject 15*b*.

3 hrs., throughout the year. M., W., F., 2:00.

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INTERMEDIATE COURSES.

PRIMARILY FOR SOPHOMORES AND JUNIORS.

2. **Schiller.** Professor PUTZKER and Mr. KEYES.

Maria Stuart, Wilhelm Tell, Die Jungfrau von Orleans, and perhaps other writings. Lectures on the topics under consideration; one exercise a week in composition, grammar, and syntax. Written exercises and conversational practice throughout the course.

3 hrs., throughout the year. Professor PUTZKER, Section I, M., W., F., 9:00; Mr. KEYES, Section II, M., W., F., 8:00, Section III, Tu., Th., S., 8:00. Prerequisite: Course 1 or 1A.

3. **Scientific German.** Associate Professor SENGER.

Dippold's Scientific Reader; Dubois-Reymond, Tierische Bewegung. Ueber die Grenzen des Naturerkennens, Die Sieben Welträtsel. Special reading assigned to students in connection with the course, principally from Virchow and Holtzendorf's collection. Exercises in composition.

3 hrs., throughout the year. M., W., F., 10:00. Prerequisite: Course 1 or 1A.

ADVANCED COURSES.

A. PRIMARILY FOR JUNIORS AND SENIORS.

4. **Goethe.** (G.E.) Associate Professor SENGER.

In the class-room, selected masterpieces of Goethe, *e.g.*, Götz von Berlichingen, Egmont, Hermann und Dorothea; Iphigenie auf Tauris; Italienische Reise; lectures on the topics under consideration; written exercises. Outside of the class-room, Schiller's Trilogy of Wallenstein.

3 hrs., throughout the year. M., W., F., 8:00. Prerequisite: Course 2 or 3.

5. **Lessing.** (G.E.) Professor PUTZKER.

In the class-room, selected masterpieces of Lessing, *e.g.*, Emilia Galotti, Minna von Barnhelm, Nathan der Weise, Gœring's Lessing's Leben; lectures on the topics under consideration; written exercises. Outside of the class-room, the study of Goethe's works continued from Course 4. Special work assigned in some cases.

3 hrs., throughout the year. M., W., F., 1:00. Prerequisite: Course 2 or 3.

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20. **Modern German Drama.** Professor SCHILLING.

3 hrs., second half-year. Tu., Th., S., 10:00.

6. **Higher Composition.** (G.E.) Mr. CENTNER.

2 hrs., throughout the year. Tu., Th., 2:00. Prerequisite: At least twenty units in German.

7. **Middle High German.** (G.E.) Associate Professor SENGER.

The Nibelungenlied; Kudrun; Hartmann von Aue's Der arme Heinrich. The language of the Middle High German period. Translation into modern German.

3 hrs., first half-year. M., W., F., 9:00. Prerequisite: Course 2 or 3.

17. **Old High German.** Mr. KEYES.

The Old High German period.

3 hrs., second half-year. Prerequisite: Course 7.

19. **Old Saxon.** Professor SCHILLING.

The Heliand, etc.

3 hrs., second half-year. Tu., Th., S., 9:00.

8. **Gothic.** (G.E.) Associate Professor SENGER.

Balg-Braune's Gothic Grammar. The Gothic Gospels. Principles of comparative Germanic phonology and morphology.

3 hrs., second half-year. M., W., F., 9:00. Prerequisite: Course 7 or 17.

14. **Classic Writers of the Middle Ages.** (G.E.) Professor SCHILLING.

The Minnesingers; the poems of Walther von der Vogelweide; Wolfram's Parzival, and other works. Discussion of the literary conditions of the period; rendering into modern German.

3 hrs., throughout the year. M., W., F., 2:00. Prerequisite: Course 7.

B. FOR SENIORS AND GRADUATES.

10. **German Lyrics of the Nineteenth Century.** (G.E.) Professor PUTZKER.

Lectures, abstracts, and essays. Life and writings of Lenau; life and writings of Kleist; life and writings of Körner; other select writings.

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2 hrs., throughout the year. Tu., Th., 1:00. Prerequisite: Course 4 or 5.

15. **The Romantic School.** (G.E.) Associate Professor SENGER.

The literature of the Romantic School. Herder's Volkslieder; Tieck; Novalis; the two Schlegels; Brentano; Eichendorff; the New Romanticists; Rückert, Uhland, Heine. Essays and composition.

3 hrs., throughout the year. M., W., 11:00; Th., 1:00. Prerequisite: Course 4 or 5.

18. **General History of German Literature.** (G.E.)
Professor SCHILLING.

This course will be conducted entirely in German.

3 hrs., first half-year. Tu., Th., S., 10:00. Prerequisite: Course 2 or 3.

C. GRADUATE COURSES.

13. **Introduction to Germanic Philology and Gothic.**
Professor SCHILLING.

3 hrs., first half-year. Tu., Th., S., 9:00.

12. **Historical German Grammar.** (G.E.)
Associate Professor SENGER.

A study of the development of Modern High German.

2 hrs., throughout the year. Th., 3:00–5:00.

9. **Goethe's Faust.** Professor PUTZKER.

Lectures and text studies.

2 hrs., throughout the year. Tu., Th., 2:00.

11. **History of the German Language.** Mr. KEYES.

3 hrs., throughout the year. Th., 9:00–11:00.

16. **Special Study.**

The instructors in German hold themselves ready to assist and advise graduates who may propose plans of special study.

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ROMANIC LANGUAGES.

F. V. PAGET, Bachelier ès Lettres, Bachelier ès Sciences, Professor of the Romanic Languages and Literatures.

C. H. HOWARD, M.A., Instructor in French.

GUSTAVE FAUCHEUX, Bachelier ès Lettres, Bachelier ès Sciences, Instructor in French.

S. A. CHAMBERS, M.A., Instructor in French.

——— ———, Instructor in French.

CARLOS BRANSBY, M.A., Instructor in Spanish.

F. H. BARTLETT, M.A., Assistant in French.

The work of Courses 1 and 2 is continuous. No credit will be given for either of the Elementary Courses to those who already have credit for twelve units. At the discretion of the officers of the department, students who enter the University with some knowledge of French or Spanish may be admitted to advanced courses in the department, and may be allowed an advanced credit; but such credit will not be more than six units, unless it be based upon work systematically performed in some university of good standing.

It is important that each student in French or Spanish be provided with a dictionary which gives phrases and idioms. One of the most satisfactory is that of Roubaud, published as Cassell's, Heath's, Classic, and otherwise. Cost in cloth binding about $1.25.

The Group Elective. Spanish or Italian may be offered separately or in conjunction with any of the Advanced Courses in French as a single subject in the Group Elective. The subject Romanic Languages includes the three.

Teachers' Certificates. Students who desire the recommendation of the department for this certificate for French must include in their lists Courses 5, 5A, and 5B; for Spanish they must include Course 19. For other courses they should consult the instructors in the department.

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ELEMENTARY COURSES IN FRENCH.

1. **Introductory Course.**
Professor PAGET, Mr. HOWARD, Mr. CHAMBERS, Mr. BARTLETT, and ———.

The essentials of French grammar, reading, translation, and composition. Aldrich and Foster's Foundations of French.

3 hrs., throughout the year. Six sections. M., W., F., 8:00, 10:00, 1:00, 2:00; Tu., Th., S., 8:00.

2. **Second-Year French.**
Professor PAGET, Mr. HOWARD, Mr. BARTLETT, and ———.

Reading and translation of novels and dramas. Professor PAGET will read with the class Le monde où l'on s'ennuie (Pailleron) in the first half-year.

3 hrs., throughout the year. Six sections. M., W., F., Sections I, II, III, 9:00; IV, V, VI, 10:00. Professor PAGET, Sections I, II, III, W., 9:00; IV, V, VI, W., 10:00.

3. **Advanced French.** Mr. CHAMBERS.

Open, as an alternative with French 2, only to those who have had at least two years of French. For the second half-year Professor PAGET will read Victor Hugo's Ernani with the class and students of French 2 having received Grade 1 or Grade 2 at the mid-year examination. Before enrolling in this course students must consult the head of the department.

3 hrs., throughout the year. M., W., F., 1:00.

INTERMEDIATE COURSES IN FRENCH.

FOR UNDERGRADUATES.

Courses 5, 5A, and 5B are required of those who intend to become teachers of French.

5. **Advanced Course in French Grammar.** Mr. FAUCHEUX.

Edgren's Grammar and Le Crime de Sylvester Bonnard.

2 hrs., throughout the year. Tu., Th., 1:00.

5A. **French Writing and Speaking.**
Mr. HOWARD and Mr. BARTLETT.

An introduction to French conversation and letter-writing.

2 hrs., throughout the year. Three sections. Tu., Th., 9:00, 10:00, 11:00.

5B. **Advanced Writing and Speaking.** Mr. FAUCHEUX.

2 hrs., throughout the year. Three sections. Tu., Th., 10:00, 11:00; M., W., 11:00. Prerequisite: Course 5A.

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ADVANCED COURSES IN FRENCH.

FOR GRADUATES AND ADVANCED UNDERGRADUATES.

A.—HISTORICAL COURSES.

7. **History of French Literature.** (G.E.) Mr. CHAMBERS.
Doumic's Histoire de la Littérature Française will be used as a text-book and commented on by the instructor.
2 hrs., throughout the year. Tu., Th., 1:00.

8. **Essays Written in French about Various Literary Topics.** (G.E.) Mr. FAUCHEUX.
A completion of the course in French writing.
2 hrs., throughout the year. Tu., Th., 2:00. Prerequisite: Course 5B.

8A. **Mediæval Literature—Epic.** (G.E.) Professor PAGET.
Lectures in English on the epic literature, beginning with the eleventh century. La Chanson de Roland.
1 hr., first half-year. M., 9:00.

8B. **Mediæval Literature—Dramatic.** (G.E.) Professor PAGET.
Lectures on the dramatic and historical literature. Le Mystère de la Passion. The four great chroniclers.
1 hr., second half-year. M., 9:00.

9A. **The Sixteenth Century—Prose.** (G.E.) Mr. BARTLETT.
A study of Montaigne, Rabelais, and other prose writers of the time. Lectures by the instructor.
1 hr., first half-year. W., 9:00.

9B. **The Sixteenth Century—Poetry.** (G.E.) Mr. BARTLETT.
Marot, Ronsard, Regnier, D'Aubigné. Lectures by the instructor.
1 hr., second half-year. W., 9:00.

10A. **The Seventeenth Century—Prose.** (G.E.) Mr. FAUCHEUX.
Critical reading of authors, and some lectures by the instructor. Descartes, Pascal, Madame de Sévigné, La Rochefoucauld, and others.
3 hrs., first half-year. M., W., F., 1:00.

10B. **The Seventeenth Century—Poetry.** (G.E.) Mr. FAUCHEUX.
Corneille, La Fontaine, Racine, Molière, and others. Critical reading and some lectures.
3 hrs., second half-year. M., W., F., 1:00.

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12A. **The Eighteenth Century.** (G.E.) Mr. CHAMBERS.

Voltaire, Rousseau. Critical reading and some lectures.

2 hrs., first half-year. Tu., Th., 3:00.

12B. **Eighteenth Century Drama.** (G.E.) Mr. CHAMBERS.

Regnard, Marivaux, Beaumarchais, and other dramatists. Same plan as in 12A.

2 hrs., second half-year. Tu., Th., 3:00.

*11A. **The Nineteenth Century, 1800–1850.** (G.E.) Mr. CHAMBERS.

A study of the Romantic Movement and of its various phases.

2 hrs., first half-year.

*11B. **The Nineteenth Century, 1850–1900.** (G.E.) Mr. CHAMBERS.

A study of the Realistic Movement and of its various phases in Balzac, Flaubert, Zola, Daudet, and Maupassant.

2 hrs., second half-year.

11C. **Nineteenth Century Drama.** (G.E.) Mr. CHAMBERS.

The chief dramas of Dumas fils, Augier, and others. Critical reading and some lectures.

2 hrs., first half-year. Tu., Th., 1:00.

11D. **Recent Writers.** (G.E.) Mr. CHAMBERS.

Lectures on recent literary movements, and critical reading of such writers as Bourget, Loti, René Bazin.

2 hrs., second half-year. Tu., Th., 1:00.

B.—VICTOR HUGO.

Each course under this head is a study of the literary, social, or philosophical ideas of the author and a critical reading of the works named.

13. **Victor Hugo's Prose.** (G.E.) Professor PAGET.

Les Misérables.

2 hrs., throughout the year. Two sections. Tu., Th., 8:00, 9:00.

*13A. **Victor Hugo's Prose.** (G.E.) Professor PAGET.

L'Homme qui Rit.

2 hrs., first half-year. Two sections.

*Not to be given in 1901–02.

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*13B. Victor Hugo's Prose. (G.E.) Professor PAGET.
Three dramas. Le Roi S'Amuse, Lucrèce Borgia, Angélo.
2 hrs., second half-year. Two sections.

*13C. Victor Hugo's Prose. (G.E.) Professor PAGET.
Quatre-vingt-treize, Ruy Blas.
2 hrs., first half-year. Two sections.

*13D. Victor Hugo's Prose. (G.E.) Professor PAGET.
Notre Dame de Paris, Choses Vues.
2 hrs., second half-year. Two sections.

14. Victor Hugo's Poetry. (G.E.) Professor PAGET.
Les Burgraves. Comments in French by the instructor.
2 hrs., first half-year. Tu., Th., 10:00.

14A. Victor Hugo's Poetry. (G.E.) Professor PAGET.
Les Voix Intérieures.
2 hrs., second half-year. Tu., Th., 10:00.

*14B. Victor Hugo's Poetry. (G.E.) Professor PAGET.
Les Chatiments.
2 hrs., first half-year.

*14C. Victor Hugo's Poetry. (G.E.) Professor PAGET.
La Fin de Satan.
2 hrs., second half-year.

C.—LECTURES IN FRENCH.

*15A. The Romantic School—Prose. (G.E.) Professor PAGET.
Rise of the School. Bernardin de St. Pierre, J. J. Rousseau, Madame de Staël, Chateaubriand.
1 hr., first half-year.

*15B. The Romantic School—Poetry. (G.E.) Professor PAGET.
The influence of the School on lyric and dramatic poetry and on the novel. Lamartine, Victor Hugo, De Musset, De Vigny.
1 hr., second half-year.

* Not to be given in 1901-02.

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*16A. **The Realistic School—Prose.** (G.E.) Professor PAGET.

The rise of the School; its close relation to the Romantic School. Balzac, Flaubert, Daudet.

1 hr., first half-year.

*16B. **The Realistic School—Drama.** (G.E.) Professor PAGET.

A study of modern dramatic literature. Augier, Dumas fils, and other dramatists.

1 hr., second half-year.

*17A. **The Naturalistic School.** (G.E.) Professor PAGET.

Zola, Les Goncourt.

1 hr., first half-year.

*17B. **The Parnassian School.** (G.E.) Professor PAGET.

The poets Gautier, Baudelaire, Leconte de Lisle, Sully-Prudhomme.

1 hr., second half-year.

17C. **Histoire du Drame en France au Dix-neuvième Siècle.** (G.E.) Professor PAGET.

1 hr., first half-year. F., 4:00.

17D. **Histoire du Drame.** (G.E.) Professor PAGET.

Continuation of the same subject.

1 hr., second half-year. M., 4:00.

COURSES IN SPANISH.

18. **Introductory Spanish.** Mr. HOWARD and Mr. BRANSBY.

Grammar and reading of modern prose. Alarcon's El Capitan Veneno, Valera's El Pajaro Verde, and similar works.

3 hrs., throughout the year. Three sections. M., W., F., 2:00, 3:00, 4:00.

19. **Spanish Speaking and Writing.** Mr. HOWARD and Mr. BRANSBY.

3 hrs., throughout the year. Three sections. M., W., F., 2:00, 3:00; Tu., Th., S., 8:00.

19B. **Modern Spanish.** Mr. BRANSBY.

A course in reading and translation. Valdes's José, Valera's Pepita Jiménez, Galdos' Doña Perfecta, and some drama.

3 hrs., throughout the year. Tu., Th., S., 9:00.

*Not to be given in 1901–02.

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19D. **History of Spanish Literature.** (G.E.) Mr. BRANSBY.

Study of a text-book and illustrative readings.

2 hrs., throughout the year. Tu., Th., 3:00.

*20. **Classic Spanish.** (G.E.) Professor PAGET.

Cervantes's Don Quixote, Calderon's El Magico Prodigioso.

2 hrs., throughout the year. Tu., Th., 11:00.

COURSES IN ITALIAN.

21. **Introductory Italian.** Mr. CHAMBERS.

The object of the course is to give a reading power in the language. Enough grammar will be given to serve as a basis for this. Modern authors: Barrili, Farina, Castelnuovo, Verga, Capuana. Short stories and comedies.

3 hrs., throughout the year. M., W., F., 8:00.

*22. **Dante's La Divina Commedia.** (G.E.)
Professor PAGET and Mr. CHAMBERS.

Inferno. Two hours a week of modern Italian authors.

3 hrs., throughout the year. M., W., F., 8:00.

*23. **Dante's La Divina Commedia.** (G.E.)
Professor PAGET and Mr. CHAMBERS.

Purgatorio. Two hours a week of modern Italian authors.

3 hrs., throughout the year.

*24. **Dante's La Divina Commedia.** (G.E.)
Professor PAGET and Mr. CHAMBERS.

Paradiso. Two hours a week of modern Italian authors.

3 hrs., throughout the year. M., W., F., 3:00.

COURSES FOR GRADUATES.

[Latin 28, low Latin, will be found a useful adjunct to any of these courses.]

25. **Old French.** Mr. FAUCHEUX.

Philological study of old texts. Grammaire Historique de la Langue Française by Kr. Nyrop. Traité de la formation de la langue française (Dict. gén.).

First half-year—Extraits de la Chanson de Roland by Gaston Paris. Second half-year—Chrestien de Troyes, Erec, Yvain—Edition Foerster.

2 hrs., throughout the year. S., 10:00–12:00.

*Not to be given in 1901–02.

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26. **Romanic Philology.** Mr. FAUCHEUX.

Phonology, morphology, and comparative syntax of the various Romanic languages.

1 hr., throughout the year—2 units each half-year. S., 9:00.

28. **Seminary.** Professor PAGET.

(*a*) Provençal in Appel's Chrestomathie, and Le Roman de Flamenca, 2nd edit., by Paul Meyer; (*b*) Old Spanish: La leyenda de los Infantes de Lara, by Ramon Menendez Pidal.

4 units, either half-year, as a maximum. Saturday morning.

29. **Special Study.** Professor PAGET.

The instructors in Romanic Languages hold themselves ready to assist and advise students who may propose plans of special study.

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RUSSIAN.

GEORGE R. NOYES, Ph.D., Instructor in English and Russian.

1. Elementary. Dr. NOYES.

Motti's Russian Grammar. Tolstoj's Snowstorm. Turgenev's Fathers and Children.

Credit value and hours of recitation to be determined.

2. Advanced. Dr. NOYES.

Rapid reading from Russian classics: Gogol, Turgenev, Dostoevskij, Tolstoj, Pushkin. Composition. Occasional lectures on Russian literature.

Credit value and hours of recitation to be determined.

POLISH.

1. Elementary. Dr. NOYES.

Wieber Kiewicz; Polinsche Grammatik. Reading of Sienkiewicz. Credit value and hours of recitation to be determined.

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MATHEMATICS.

IRVING STRINGHAM, Ph.D., Professor of Mathematics.

GEORGE C. EDWARDS, Ph.B., Associate Professor of Mathematics.

MELLEN W. HASKELL, Ph.D., Associate Professor of Mathematics.

ARCHIE B. PIERCE, M.A., Instructor in Mathematics.

CHARLES A. NOBLE, Ph.D., Instructor in Mathematics.

ERNEST J. WILCZYNSKI, Ph.D., Instructor in Mathematics.

ALBERT W. WHITNEY, A.B., Instructor in Mathematics.

DERRICK N. LEHMER, Ph.D., Instructor in Mathematics.

EDWIN M. BLAKE, Ph.D., Instructor in Mathematics.

Students in the College of Letters, or of Social Sciences, must include the subject of Analytic Geometry as an essential part of their programme of mathematical studies. They may satisfy this prescription by electing Course 1 in their Freshman year; but those who prefer a more extended course will do well to elect Courses 2, 4, and 5. Course 6 is strongly recommended to all students who have not already studied Solid Geometry.

Students in the College of Commerce may elect Courses 1 and 6, or Courses 2, 4, and 5.

Students in the Colleges of Natural Sciences or of Agriculture, may elect either Courses 2, 4, 5, and 6, or Courses 1, 2, and 6; or Course 3A, if they enter with credit in Solid Geometry and Plane Trigonometry.

Course 3A is prescribed to Freshmen in the Colleges of Engineering and of Chemistry, and Course 3B to Sophomores in the Colleges of Engineering; Course 10 to Sophomores in the College of Civil Engineering; Course 19A to Juniors in the College of Mechanics. These courses are also open to students in any of the other colleges who have the necessary preparation.

Students wishing to make a specialty of mathematics should consult the members of the department as early as possible. The following programme may serve as a proper sequence: Freshman year: Courses

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2, 4, 5, 6; Sophomore year: Courses 9, 12, 13; Junior year: Courses 11, 14, 17; Senior year: Courses 18, 19, 20.

Students wishing to take mathematics with reference to its applications to Astronomy and Physics, should elect Courses 9, 14, 19, and, if possible, 23 and 24.

The Group Elective. A thorough knowledge of algebra, plane trigonometry, plane analytic geometry, and the differential and integral calculus is prerequisite to Group Elective work.

Teachers' Certificates. The department will, in general, recommend as qualified to teach mathematics in high schools, only such graduates as have passed with credit in Courses 2, 4, 5, 6, 9, 11, 12, 13, 17, 18. It is also of great importance that the prospective teacher of mathematics should be well informed on the relation of mathematics to other sciences, and he should to that end devote a considerable portion of his time to at least one of the closely related sciences. The department further reserves the right to exact a practical test of the candidate's ability to present a clear and interesting exposition of subjects taught in the high school.

INTRODUCTORY COURSES.

FOR FRESHMEN AND SOPHOMORES ONLY.

1. **Elements of Analysis.**

Associate Professor HASKELL, Mr. PIERCE,
Dr. NOBLE, Dr. WILCYNSKI, Mr. WHITNEY,
Dr. LEHMER, and Dr. BLAKE.

The methods of higher algebra, trigonometry, and analytic geometry, with some account of their historical development.

3 hrs., throughout the year. M., W., F., 9:00, 10:00, 2:00, 3:00; Tu., Th., S., 9:00, 10:00. Prescribed (except as provided above) to Freshmen in the Colleges of Letters, Social Sciences Natural Sciences, Commerce, and Agriculture.

2. **Algebra.**

Professor STRINGHAM, Associate Professor HASKELL,
and Mr. WHITNEY.

The progressions and other simple series, inequalities and limits, exponentials and logarithms, permutations and combinations, binomial theorem for any index, expansion of functions in series, convergency of series, determinants, elements of the theory of equations.

3 hrs., either half-year. M., W., F., 9:00, 10:00.

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3A. Elements of Analysis, with Applications; First Course.

Associate Professor EDWARDS, Mr. PIERCE, Dr. NOBLE, Dr. WILCZYNSKI, and Mr. WHITNEY.

A practical course in algebra, analytic geometry, and the elements of the differential calculus, adapted particularly to the needs of students in engineering.

5 hrs., throughout the year. M., Tu., W., Th., F., 8:00. Prescribed, Freshman year, in the Colleges of Engineering. Open to other students who have passed in Solid Geometry and Plane Trigonometry.

3B. Elements of Analysis, with Applications; Second Course.

Associate Professor EDWARDS, Mr. PIERCE, Dr. LEHMER, and Dr. BLAKE.

Continuation of Course 3A. Differential and integral calculus, with applications to geometry.

3 hrs., throughout the year. M., W., F., 8:00, 9:00. Prerequisite: Course 3A, or its equivalent. Prescribed, Sophomore year, in the Engineering Colleges.

4. Plane Trigonometry.

Associate Professor HASKELL, Mr. WHITNEY, Dr. LEHMER and Dr. BLAKE.

The development of the general formulæ of plane trigonometry. Practice in the use of logarithmic tables; applications of trigonometry to the solution of triangles and to mensuration in general.

2 hrs., either half-year. First half-year, Tu., Th., 9:00, 10:00, 11:00; second half-year, Tu., Th., 10:00, 11:00.

5. Plane Analytic Geometry.

Associate Professor HASKELL, Dr. NOBLE, Mr. WHITNEY, Dr. LEHMER, and Dr. BLAKE.

The analytic geometry of the straight line, the circle, and the conic sections, including a discussion of the general equation of the second degree, and some special examples in higher loci.

3 hrs., either half-year. M., W., F., 9:00, 10:00. Prerequisite: Course 4.

6. Solid and Spherical Geometry.

Associate Professor EDWARDS, Dr. LEHMER, and Dr. BLAKE.

The fundamental propositions of the Euclidean geometry of space.

2 hrs., either half-year. Two sections, each half-year. Tu., Th., 9:00, 10:00.

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7. **Spherical Trigonometry.** Dr. WILCZYNSKI.

The development of the formulæ of spherical trigonometry, the solution of spherical triangles, problems in spherical mensuration.

1 hr., second half-year. S., 8:00.

INTERMEDIATE COURSES.

PRIMARILY FOR SOPHOMORES AND JUNIORS.

9. **Differential and Integral Calculus; First Course.** Dr. NOBLE.

Development of the fundamental principles and formulæ of the differential and integral calculus; applications to various problems in geometry and analysis, such as indeterminate forms, maxima and minima, expansions of functions in series, curvature, length of curves, areas, volumes, centers of position, etc.

3 hrs., throughout the year. M., W., F., 9:00. Prerequisite: Course 1 or Course 5.

9B. **Differential and Integral Calculus; First Course.** Dr. WILCZYNSKI.

Identical with Course 9.

3 hrs., throughout the year, beginning second half-year. M., W., F., 10:00. Prerequisite: Course 1 or Course 5.

10. **Problems in the Differential and Integral Calculus.** (G.E.) Associate Professor EDWARDS.

2 hrs., second half-year. Tu., Th., 9:00. Prescribed, Sophomore year, in the College of Civil Engineering; elective in the College of Mechanics, with Mechanical Engineering, Course 8B.

11. **Determinants and Theory of Equations.** (G.E.) Associate Professor HASKELL.

The theory of determinants and their more important applications to geometry and algebra; algebraic resolution of equations, elimination, elements of the theory of substitutions, and introduction to the theory of invariants.

2 hrs., throughout the year. Tu., Th., 9:00. Open to students who have taken, or are taking, Course 9.

12. **Advanced Analytic Geometry.** Associate Professor HASKELL.

General properties of conic sections; introduction to the theory of higher plane curves.

3 hrs., first half-year. M., W., F., 10:00. Prerequisite: Course 1 or Course 5.

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13. **Synthetic Projective Geometry.** (G.E.) Dr. BLAKE.

3 hrs., second half-year. M., W., F., 10:00.

14. **Differential and Integral Calculus; Second Course.** (G.E.) Professor STRINGHAM.

Continuation of Course 9.

3 hrs., throughout the year. M., W., F., 9:00. Prerequisite: Course 9 or 9B.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES.

*15. **Analytic Projective Geometry.** (G.E.) Associate Professor HASKELL.

The fundamental principles of projective geometry treated analytically. The principle of duality, cross-ratios, involution, linear transformations of one, two, and three dimensional figures, particularly of loci of the second order and class.

3 hrs., throughout the year. M., W., F., 10:00. Prerequisite: Course 12.

16. **Quaternions.** (G.E.) Mr. PIERCE.

An elementary presentation of the principles of the subject, with illustrations of its application to geometry and to mechanics.

3 hrs., throughout the year. M., W., F., 2:00.

17. **History of Mathematics.** (G.E.) Professor STRINGHAM.

Outlines of the history of mathematical discovery, and of the development of mathematical thought, with special reference to its significance as a factor in intellectual progress.

2 hrs., second half-year. Tu., Th., 10:00.

18. **Logic of Mathematics.** (G.E.) Professor STRINGHAM.

Analysis of the foundation principles of geometry and algebra. The number-system and the vector-system of algebra compared. The geometrical theory of proportion, and the irrational. Historical notes.

2 hrs., throughout the year. Tu., Th., 11:00. Designed especially for teachers and prospective teachers of mathematics. Prerequisite: A course in formal logic.

19A. **Differential Equations.** (G.E.) Associate Professor EDWARDS.

Theory and methods of solution of total differential equations, followed by a short introduction to partial differential equations.

*Not to be given in 1901–02.

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3 hrs., first half-year. M., W., F., 10:00. Prescribed, Junior year, in the College of Mechanics.

*19B. **Differential Equations.** (G.E.) Associate Professor EDWARDS.

3 hrs., second half-year. M., W., F., 10:00. Elective to students who have completed Course 19A.

20. **Selected Topics in Higher Mathematics.** (G.E.)

Dr. WILCZYNSKI.

A general introduction to some important methods in modern higher mathematics.

2 hrs., throughout the year. Tu., Th., 9:00.

20A. **Theory of Probabilities, with special reference to the problems of Life and Endowment Insurance, and of Annuities.** (G.E.)

MR. WHITNEY.

2 hrs., first half-year. Tu., Th., 10:00. Students electing this course are advised to elect also Course 22 in History and Political Sciences (Statistics).

HIGHER COURSES.

PRIMARILY FOR GRADUATE STUDENTS.

Of the following courses it is expected that five or six will be offered each year. In 1901–02 these will be Courses 24, 26, 27, 31, and 40. Students in order to elect any of them must have previously taken the prerequisite intermediate courses; in most cases, at least Courses 9, 11, 14, and 15.

*21. **Theory of Functions of Real Variables.**

Professor STRINGHAM.

Simple and multiple integrals; line, surface, and space integrals; Laplace's Equation and its applications; series; geometrical applications.

2 hrs., throughout the year.

*22. **Transformation Groups and Differential Equations.**

Dr. WILCZYNSKI.

An introduction to Lie's theory; applications to the theory of functions, to the theory of invariants of linear differential equations, and to hydrodynamics.

2 hrs., throughout the year.

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*23. Partial Differential Equations. Mr. WHITNEY.

Theory of definite integrals, Fourier's Theorem and applications, introduction to harmonic functions.

2 hrs., second half-year.

24. Theory of Functions of a Complex Variable. Dr. NOBLE.

(Introductory course.) Lectures on the general theory of functions, with special reference to the ideas of Riemann.

3 hrs., first half-year. M., W., F., 3:00.

*25. Higher Geometry. Associate Professor HASKELL.

Modern developments in the analytical geometry of two and of three dimensions. Application of the differential and integral calculus to algebraic curves and surfaces.

3 hrs., throughout the year.

26. Absolute Geometry. Professor STRINGHAM.

An analytical treatment of the absolute geometry of space.

2 hrs., throughout the year. S., 9:00–11:00.

27. Elliptic Functions. Associate Professor HASKELL.

Reduction of elliptic integrals, Abel's Theorem, development of elliptic functions in series, applications to various problems of geometry and mechanics.

3 hrs., first half-year. M., W., F., 9:00. Prerequisite: Course 24.

*28. Abelian Functions. Associate Professor HASKELL.

An advanced course in the theory of functions of a complex variable, with applications to the theory of higher plane curves.

3 hrs., throughout the year. Prerequisite: Course 24.

*29. Spherical Harmonics. Associate Professor HASKELL.

Elements of the theory of spherical harmonics, with special reference to their application in the solution of certain physical problems.

2 hrs., second half-year.

*30. Theory of Algebraic Forms. Associate Professor HASKELL.

Theory of linear transformation, invariants and covariants of binary and ternary quantics. Applications to the theory of equations, and to higher plane curves.

3 hrs., throughout the year.

* Not to be given in 1901–02.

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31. **Theory of Numbers.** Dr. LEHMER.

Properties of whole numbers, both ordinary and complex, theory of congruences, residues of powers, primitive roots, quadratic forms.

3 hrs., second half-year. M., W., F., 3:00.

*32. **Theory of Substitutions.** Mr. PIERCE.

General properties of substitutions, theory of groups, algebraic resolution of equations, cyclotomic and Abelian equations.

3 hrs., second half-year.

*33. **Linear Differential Equations.** Dr. WILCZYNSKI.

2 hrs., second half-year. M., W., 11:00.

*36. **The Hypergeometric Function.** Dr. WILCZYNSKI.

2 hrs., throughout the year. M., W., 11:00.

*38. **Calculus of Variations.** Dr. WILCZYNSKI.

1 hr., second half-year. W., 1:00.

40. **Mathematical Seminary.** Professor STRINGHAM.

Conferences between members of the mathematical department and students engaged in higher mathematical work, for the discussion of questions related to their studies, and for the examination of recent mathematical literature; under the direction of Professor STRINGHAM. Meetings once a week. Tu., 2:00–4:00. Credit value to be determined in each case.

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*Not to be given in 1901–02.

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The Young Men's Christian Association

AND

The Young Women's Christian Association

Of the UNIVERSITY of CALIFORNIA

Announcement of Courses in

BIBLE STUDY

FOR THE ACADEMIC YEAR

1901-1902

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IT is being recognized more each year that a comprehensive, first-hand knowledge of the Bible is a necessary part of a thorough education. The Christian Associations are endeavoring to supply this need by affording students an opportunity for systematic and comprehensive study of the Bible. The plan which is followed is one which has been used with great success in all of the leading colleges and universities. Four courses are offered, which, when completed, will cover in a general way the entire Bible. The classes will continue as in the past, under student leadership, as this plan has been found to be the most successful.

Bible Study Committees

Y. M. C. A.: I. B. Rhodes, '02, Chairman; J. M. Eshleman, '02; B. R. Bowron, '02; W. C. Kerr, '04; W. E. Basham, '03; B. F. Hathaway, '04.

Y. W. C. A.: Grace Williams, '03, Chairman; Eleanor Nottingham, '04; Nellie Baldridge, '03; Gertrude Davidson, '04.

Class Leaders

Y. M. C. A.: L. J. Barker, '03; J. M. Brewer, '02; B. R. Bowron, '02; A. B. Clayton, '02; L. A. Elmore, '03; J. M. Eshleman, '02; F. F. Goodsell, '02; N. C. Gregory, '01; H. M. Hall, '01; W. C. Kerr, '04; C. W. Petit, '03; I. B. Rhodes, '02; W. D. Root, '02; R. R. Service, '02; J A. Sutherland, '04; S. B. Wright, '03.

Y. W. C. A.: Grace Boggs, '02; Evelyn Baugh, '03; May Buffington,'99; Nina Farwell,'02; Lillie Janes, '01; Grace Moody, '02; Eleanor Nottingham, '04; Mary Page, '03; Mary Poage, '02; Lucy Robinson, '02; Irene Taylor, '01; Grace Williams, '03; Mamie Thorpe, '02; Alice Wythe, '02.

1—Studies in the Life of Christ

A practical, comprehensive course based on the life and works of Christ as presented in the four gospels, with special reference to historical development and the application of His teachings.

Texts: Stevens and Burton's "Harmony of the Gospels," and Sharman's "Studies in the Life of Christ." This course must precede all others.

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One hour per week throughout the year. Time required for preparation, twenty minutes a day.

Y. M. C. A.: Ten Sections: Mr. Barker, Mr. Brewer, Mr. Goodsell, Mr. Kerr, Mr. Gregory, Mr. Petit, Mr. Rhodes, Mr. Service, Mr. Sutherland, Mr. Wright.

Sun. 9:45, Mon. 4:00, Wed. 8:00, Thurs. 4:00, Sat. 8:00.

Y. W. C. A.: Nine Sections: Miss Taylor, Miss Buffington, Miss Page, Miss Boggs, Miss Nottingham, Miss Moody, Miss Thorpe, Miss Farwell, Miss Williams.

Mon. 4:00, Tues. 1:00, Wed. 4:00, Thurs. 11:00, 4:00.

2—Studies in the Acts and Epistles

With special reference to the spread and development of the Christian Church, based on a careful study of the Acts and the Epistles of Paul, as arranged for historical study in "The Records and Letters of the Apostolic Age," edited by E. D. Burton.

PREREQUISITE: COURSE 1.

One hour per week throughout the year. Time for preparation, twenty minutes a day.

Y. M. C. A.: Four Sections: Mr. Clayton, Mr. Elmore, Mr. Eshleman, Mr. Hall.

Sun. 9:45, Mon. 4:00, Thurs. 1:00, 4:00.

Y. W. C. A.: Three Sections: Miss Baugh, Miss Poage, Miss Robinson.

Mon. 4:00, Thurs 4:00.

3—Studies in Old Testament Characters

Based on "Old Testament Records, Poems, and Addresses," by Wilbert Webster White. Arranged for daily personal study, with reference to the lives and works of the Old Testament heroes.

PREREQUISITE: COURSES 1 AND 2.

One hour per week throughout the year. Time required for preparation, twenty minutes a day.

Y. M. C. A.: Two Sections: Mr. Bowron, Mr. Root.

Sun. 9:45, Tues. 4:00.

Y. W. C. A.: One Section: Miss Wythe.

Thurs. 4:00.

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*4—Studies in the Teachings of Jesus and His Apostles

A topical course on New Testament teachings with special reference to a clear understanding and application of the great foundation truths of Christianity.

5—Lectures

As supplementary to the courses named above, occasional lectures on Bible topics will be given by University Professors.

Bible Study Library

A number of reference books have been collected in Room 4, Stiles Hall, for the use of those who wish to make special study of Bible topics. It is expected that this list of books will be largely increased during the coming year. A number of valuable books for reference may also be found in alcoves Three A and Three B in the University Library.

Text Books

The cost of books for courses 1 and 2 is $1.25 per set. For course 3, $1.50 per set. Books may be purchased of the General Secretary or the Chairman of the Bible Study Department.

Enrolment, Etc.

The above courses are open to all students of the University. Students will enroll with the class leaders at the first session of the class. Classes will begin September 1, 1901.

All classes, unless otherwise announced, will meet in Stiles Hall. The schedule of hours, as here given, is provisional.

*Course 4 will not be given in 1901–1902.

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PHYSICS.

FREDERICK SLATE, B.S., Professor of Physics.
W. J. RAYMOND, B.S., Assistant Professor of Physics.
PERCIVAL LEWIS, Ph.D., Assistant Professor of Physics.
E. R. DREW, B.S., Instructor in Physics.
GEORGE K. BURGESS, Ph.D., Instructor in Physics.
ARTHUR INCELL, B.S., Assistant in Physics.
W. T. SKILLING, B.S., Assistant in Physics.
A. S. KING, M.S., Assistant in Physics.
W. A. SHELDON, Assistant in Physics.
C. E. MAGNUSSON, Ph.D., Assistant in Physics.
ALBERT R. HAGER, B.S., Assistant in Physics.
W. R. STAMPER, Mechanician in the Department of Physics.

Courses 1 to 3 are fundamental and designed to meet the needs of students preparing for applications of Physics, or advanced work in the subject itself. Course 4 is especially designed for students in the Colleges of Letters and Social Sciences, but if properly accompanied by laboratory exercises, it may also serve as a basis for advanced study. Courses 2A and 4 are alternatives; credit towards graduation will not be allowed for both of them. Students who have completed Course 1 will profit greatly if they supplement the course of laboratory work regularly laid out. For credit on special and supplementary laboratory work see Course 18. The Physical Laboratory will be open five days a week throughout the year, and may be used, under the guidance of the instructors concerned, by advanced students.

Laboratory deposits are at the rate of five dollars per half-year for each laboratory exercise per week. The average amount returned to the student at the end of the half-year, after deducting for cost of materials actually used and for breakage of apparatus, is about one-half of the deposit.

The Group Elective. Students who choose Physics in their Group Elective must include an adequate amount of laboratory exercises in the work chosen; the instructors should be consulted on this point. Such students are strongly advised to take Course 5 in the Junior year.

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Notice that the first half-year of this course may be combined with Course 6 or Course 7 to form a year's work.

Courses 1 and 2A in Physics are prerequisite to Group Elective work in all departments of Natural Science. By special arrangement Course 4 may be substituted for Course 2A.

Teachers' Certificates. Applicants for the teacher's recommendation in Physics, in making up the twenty units required, must include in their work Courses 1 and 3, with either Course 4 or Course 2A. See statements under these headings.

Beginning with May, 1903, twenty-four units of Physics will be required for the teacher's recommendation.

1. Elementary Physics. Dr. BURGESS and ——— ——— (recitations); ——— ———, (laboratory).

Hydrostatics, heat, light, sound, mechanics, magnetism, and electricity. Recitation once a week, and laboratory exercises twice a week.

7 hrs., throughout the year—3 units each half-year. Laboratory work: Section I, Tu., Th., 9:00–12:00; II, W., 1:00–4:00, S., 9:00–12:00; III, M., F., 1:00–4:00; IV, Tu., Th., 1:00–4:00. 1, 2 E. Recitations (four sections): Tu., 1:00; M., 1:00; Th., 1:00; S., 8:00. 13 S. Open to students who have passed the entrance examination in Physics. Prescribed, Freshman year, in the Colleges of Agriculture, Engineering, and Chemistry.

2A. General Physics. Assistant Professor LEWIS and Mr. DREW.

Lectures and recitations with experimental illustration, and assigned problems. Properties of matter, heat, sound, light, magnetism, and electricity, treated with reference to principles which underlie measurement in the Physical Laboratory, and other applications.

3 hrs., throughout the year. M., W., F. Section I, Assistant Professor LEWIS, 9:00; Section II, Mr. DREW, 10:00. Open to students who have passed an examination covering the ground of Course 1. Prescribed, Sophomore year, in the Colleges of Agriculture, Engineering, and Chemistry.

3. Physical Measurement. Mr. DREW and Mr. INCELL.

Experimental work requiring quantitative results. Methods are selected so as to show instructive relations of physical principles, and their adaptation to practical problems. The course is

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properly varied to suit the needs of students in the different colleges. Laboratory exercises twice a week.

6 hrs., throughout the year—2 units each half-year. Section I, M., F., 1:00–4:00; II, Tu., Th., 9:00–12:00; III, Tu., Th., 1:00–4:00. 7 S. Prescribed, Sophomore year, in the Colleges of Engineering and Chemistry.

4. **General Physics.** Professor SLATE.

Lectures and recitations, with experimental illustration, on topics in heat, light, sound, and electricity; giving prominence to subjects which are of importance as connected with the growth and the present condition of the science.

3 hrs., throughout the year. Tu., Th., 11:00; S., 9:00. 13 S. Prerequisite: At least full Sophomore standing. The attention paid to methods of presentation makes this a profitable course for prospective teachers of elementary physics.

5. **Analytic Mechanics.** (G.E.)

Professor SLATE and Assistant Professor RAYMOND.

The mathematical treatment of the important principles of dynamics and statics, fully illustrated by problems and applications.

4 hrs., throughout the year. Two sections. M., Tu., Th., F., 8:00. 14 S and 13 A. Prerequisite: Course 9 or 3B in Mathematics. Prescribed, Junior year, in the Colleges of Engineering.

6. **Harmonic Motion.** (G.E.) Assistant Professor RAYMOND.

The analytical treatment of wave-motion, with applications to sound, light, and electricity. Lectures.

2 hrs., second half-year. Tu., Th., 10:00. 14 S. Prerequisite: Course 5, first half-year, and Course 2A or 4. This course forms an alternative continuation of Course 5 in the second half-year.

7. **Absolute Electrical Measurements.** (G.E.)

Assistant Professor RAYMOND.

Lectures and laboratory exercises twice a week.

7 hrs., second half-year—3 units. Lecture, W., 8:00. 14 S. Laboratory, Tu., Th., 1:00–4:00. 2 S. Prerequisite: Course 5, first half-year, and Courses 1, 2A, 3, and 10. This course forms an alternative continuation of Course 5 in the second half-year. Elective, Junior year, in the College of Mechanics.

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8. **Theory of Light.** (G.E.) Mr. DREW.

Lectures, with experimental illustration. Problems relating to the theory of optical instruments, treated by the methods of geometrical optics and of the wave-theory.

2 hrs., throughout the year, but may be taken for the first half-year only. Tu., Th., 11:00. 14 S. Prerequisite: Course 2A or 4 in Physics; Course 9 or 3B in Mathematics.

10. **Electricity.** (G.E.) Assistant Professor RAYMOND.

Elements of the mathematical theory of electricity and magnetism, with some of the more important applications. Lectures.

2 hrs., first half-year. Tu., Th., 10:00. 14 S. Prerequisite: Course 2A or 4 in Physics; Course 9 or 3B in Mathematics. Elective, Junior year, in the College of Mechanics.

11. **Spectroscopy.** (G.E.) Assistant Professor LEWIS.

Lectures, with experimental illustration, on methods and results of investigation, and spectroscopic theories.

2 hrs, throughout the year, but may be taken for the first half-year only. M., W., 10:00. Prerequisite: Course 8.

13. **Physical Optics.** (G.E.) Assistant Professor RAYMOND.

Laboratory exercises twice a week.

6 hrs., first half-year—2 units. M., F., 1:00–4:00. 7 S.

14. **Advanced Physical Measurement.** (G.E.)
Assistant Professor RAYMOND.

Problems involving accurate measurement and mathematical work. Laboratory exercises twice a week.

6 hrs., first half-year—3 units. Tu., Th., 1:00–4:00. 7 S. Prescribed, Senior year, in the Course in Mechanical Engineering, College of Mechanics.

15. **Dynamics of Rotation.** (G.E.) Professor SLATE.

Theory of the gyroscope, including precession and nutation.

2 hrs., throughout the year. Tu., Th., 4:00. Prerequisite: Course 5. Primarily for graduates.

16. **Special Advanced Study and Research.** (G.E.)
Assistant Professor LEWIS.

Laboratory work throughout the year, on problems assigned according to the preparation and needs of individual students. Credit value to be fixed in each case. Primarily for Graduates.

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17. **Readings and Discussions.** (G.E.) Professor SLATE.

Work throughout the year, for Seniors and Graduate Students, upon topics selected by special arrangement. The following have been treated during the period 1896–1901. Recent advances in the theory of electrolysis: The development of the doctrine of conservation of energy; Mathematical theory of electricity; Theory of double refraction and polarization; Electro-magnetic theory of light.

2 hrs., throughout the year. 15 S. Primarily for Graduates.

18. **Special Undergraduate Study.** (G.E.)*

Assistant Professors RAYMOND and LEWIS.

All special laboratory work not included in courses announced above. Credit value to be fixed in each case.

*May be chosen in the Group Elective by special arrangement only.

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ASTRONOMY.

ARMIN O. LEUSCHNER, Ph.D., Sc.D., Associate Professor of Astronomy and Geodesy, and Director of the Students' Observatory.

ALEXANDER MCADIE, M.S., Honorary Lecturer on Meteorology.

SIDNEY D. TOWNLEY, Sc.D., Instructor in Practical Astronomy.

ADELAIDE M. HOBE, B.S., Assistant in Astronomy.

JAMES D. MADDRILL, Student Assistant in Astronomy.

Special Announcement. A special announcement concerning the facilities and the courses of instruction in the Berkeley Astronomical Department, and in the Lick Astronomical Department, at Mount Hamilton, has been published. Copies may be obtained from the Director of the Lick Observatory, Mount Hamilton, California, or from the Director of the Students' Observatory, Berkeley, California.

Courses 1 and 2 are designed especially to fulfil the requirement in prescribed Natural Science for students in the Colleges of General Culture.

A part of Course 1 consists of special lectures at the regular hour by the Director and Astronomers of the Lick Observatory.

Geodesy, navigation, and nautical astronomy, especially adapted to the needs of students in the College of Commerce, will be included in Courses 2 to 4, but a special section for such students may be formed.

The Group Elective. Courses 1 and 2A in Physics are prerequisite to Group Elective work in Astronomy.

1. **Modern Astronomy.**

Associate Professor LEUSCHNER, the Director and Astronomers of the Lick Observatory, and Mr. MCADIE.

(*a*) An introductory course during the first half-year. General facts and principles underlying the science of astronomy in all its branches. (*b*) Second half-year. Progress in astronomy through modern methods, especially spectroscopic and photographic.

2 hrs., throughout the year. Tu., Th., 11:00. O. For observatory work in connection with this course, students will ordinarily elect Course 2; but may, instead, take Course 4A or 4B, subject to the prerequisites announced.

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2. **Supplement to Course 1.**
Associate Professor LEUSCHNER, Dr. TOWNLEY, and Miss HOBE.

Practice in observing in connection with Course 1. One or two evenings or afternoons a week in the observatory.

3 or 6 hrs., throughout the year, as the student may elect—3 or 6 units. The observatory is open for this course Tu., Th., 7:00–10:00 p.m., two afternoons, and S., morning. The course is open to students who are taking or have taken Course 1 or 3.

3. **General Astronomy.** (G.E.) Dr. TOWNLEY.

3 hrs., first half-year. Tu., Th., S., 8:00. O. Prerequisite: A knowledge of general physics. For observatory work in connection with this course, students may elect Course 2, 4A, or 4B, subject to the prerequisites announced.

4A. **Practical Astronomy.** (G.E.) Dr. TOWNLEY and Miss HOBE.

Lectures and observatory work. Geodesy, navigation, and nautical astronomy. Practical work in the observatory with sextant, clock, chronograph, transit-and-zenith telescope, equatorial telescope, alt-azimuth instrument. Computing.

7 hrs.—3 units, first half-year; 8 hrs.—4 units, second half-year. First half-year, lecture Tu. or Th., 9:00, observatory, Tu., Th., 7:00–10:00 p.m.; second half-year, lectures Tu., Th., 9:00, observatory, Tu., Th., 7:00–10:00 p.m. O. Prerequisite: Course 7 in Mathematics; either Course 1 or 3 in Astronomy. The course should also be preceded by a course in differential calculus.

4B. **Practical Astronomy.** (G.E.) Dr. TOWNLEY and Mr. MADDRILL.

The subject-matter of Course 4A more briefly presented, and adapted to the needs of students of Civil Engineering.

7 hrs.—3 units, first half-year; 3 hrs.—1 unit, second half-year. First half-year, lecture, Tu., Th., 9:00, and two observatory periods; second half-year, one observatory period. The observatory is open for this course, Tu., or Th., 7:00–10:00 p.m., two afternoons, and S., morning. But the arrangement of the work depends so largely upon weather conditions, that the student should reserve for this course several of the periods mentioned. Prerequisite for students not in the College of Civil Engineering: Course 7 in Mathematics; either Course 1 or 3 in Astronomy. Prescribed, Senior year, in the Course in Railroad Engineering, College of Civil Engineering.

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5. History of Astronomy. Dr. TOWNLEY.

3 hrs., second half-year. M., W., F., 8:00. O. Prerequisite: Course 1 or 3.

6. Theoretical Astronomy. (G.E.) Associate Professor LEUSCHNER.

4 hrs., throughout the year. Tu., Th., 2:00–4:00. O. Prerequisite: Courses 3 and 4A; Course 5 in Physics; Course 9 or 9B in Mathematics.

7. Method of Least Squares. (G.E.) Dr. TOWNLEY.

The fundamental principles and processes of the Method of Least Squares, and their application to the solution of astronomical, physical, and engineering problems.

2 or 3 hrs., first half-year. Tu., Th., 10:00; W., 8:00. Two units of lectures and one unit of practical application. O. Prerequisite: Working knowledge of the differential and integral calculus. Prescribed, Junior year, two units (lectures), in the Course in Railroad Engineering, College of Civil Engineering.

8. Mechanical Quadratures. (G.E.)
Associate Professor LEUSCHNER.

Development of the formulæ of numerical differentiation and integration, and their application in the construction of tables.

3 hrs., second half-year. Hours to be arranged with the instructor. Prerequisite: Course 9 or 9B in Mathematics. Offered alternately with Course 9.

9. Interpolation and the Use of Tables. (G.E.)
Associate Professor LEUSCHNER.

The more useful formulæ of interpolation, and their application in the use of astronomical and other tables. Practice in extensive numerical computations, with special aim at rapidity and exactness. Calculating machines. Life insurance.

3 hrs., second half-year. Hours to be arranged with the instructor. O. Prerequisite: Algebra and trigonometry. Offered alternately with Course 8.

10. Summer School. (G.E.) Dr. TOWNLEY.

A continuation of Course 4. Four weeks during the summer vacation. The students determine the longitude (by the telegraphic method) or the latitude (by the method of Talcott) of the Students' Observatory.

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11. Advanced Practical Astronomy. (G.E.) Dr. TOWNLEY.

The theory of refraction; eclipses.

2 hrs., second half-year. Hours to be arranged with the instructor. O. Prerequisite: Course 4.

12. Theoretical Astronomy. Associate Professor LEUSCHNER.

The course treats of the relative accuracy of the various methods of determining preliminary orbits.

2 hrs., throughout the year. Hours to be arranged with the instructor. Prerequisite: Course 6. Primarily for Graduates.

13. Perturbations and Celestial Mechanics.

Associate Professor LEUSCHNER.

Adapted to the needs and preparation of the students. The course may be continued through three years.

The following subjects are treated: General principles; special perturbations in rectangular and polar coördinates; method of variation of constants; Hansen's method of determining the absolute perturbations of the minor planets; Gyldèn's method after Brendel's Theorie der kleinen Planeten. Selected topics from Tisserand's Mécanique Céleste, Poincaré's Les Nouvelles Méthodes de la Mécanique Céleste, and Gyldèn's works, etc.

4 hrs., throughout the year. M., W., 2:00–4:00. For Graduates.

14. Advanced Practical Astronomy. (G.E.) Dr. TOWNLEY.

3 hrs., throughout the year—1 unit each half-year. O. Hours to be arranged with the instructor.

15. Advanced Study and Research. Dr. TOWNLEY.

Investigation of special problems to be selected according to the preparation and the needs of individual students.

Hours and credit value arranged in each case. Primarily for Graduates.

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GEOGRAPHY.

GEORGE DAVIDSON, Ph.D., Sc.D., Honorary Professor of Geodesy and Astronomy; Professor of Geography.

LINCOLN HUTCHINSON, M.A., Instructor in Commercial Geography.

1. **The Currents and Climatology of the Pacific Ocean.**
Professor DAVIDSON.

The geography, productions, and commerce of the countries bordering the Pacific Ocean and contiguous waters. The highways of commerce. The great river and lake systems of the world. The geography of raw products.

3 hrs., first half-year. M., W., F., 2:00. Prerequisite: At least Junior standing.

2. **The Currents and Climatology of the Pacific Ocean.**
Professor DAVIDSON.

Continuation of Course 1.

3 hrs., second half-year. M., W., F., 2:00. Prerequisite: At least Junior standing.

3. **The Geography of the Pacific Coast Countries.**
Mr. HUTCHINSON.

The climatology, currents, and tides; the productions; exports and imports. Transportation by land and by water.

2 hrs., throughout the year. Tu., Th., 2:00.

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CHEMISTRY.

*W. B. RISING, M.E., Ph.D., Professor of Chemistry.

EDMOND O'NEILL, Ph.B., Associate Professor of Organic and Physiological Chemistry.

H. C. BIDDLE, Ph.D., Instructor in Chemistry.

W. C. BLASDALE, Ph.D., Instructor in Chemistry.

EDWARD BOOTH, Ph.B., Instructor in Chemistry.

WILLIAM C. MORGAN, Ph.D., Instructor in Chemistry.

——— ———, Instructor in Chemistry.

CHARLES GILMAN, Assistant in Chemistry.

It is desirable that students complete the preparatory work in chemistry before undertaking work in this department in the University. To students who have not taken chemistry in the high schools, an opportunity to do preparatory work is offered in the Summer Session.

Courses 1, 2, 3, aud 4 are prerequisite to all other courses in Chemistry. Course 5A or 5B is prerequisite to Courses 9 to 31.

Laboratory deposits are fifteen dollars per half-year for Course 3 or 4, and ten to twenty-five dollars per half-year for the other laboratory courses. The average amount returned to the student at the end of the half-year, after deducting for cost of materials, gas, etc., actually used and for breakage of apparatus, is about three dollars in Course 3 or 4, and about five dollars in the other courses.

The Group Elective. Courses 1 and 2A in Physics, are prerequisite in the Group Elective in Chemistry.

1. General Inorganic Chemistry—Non-Metals.

Dr. BIDDLE and Mr. BOOTH.

Lectures, with study of a manual, and full experimental illustration.

3 hrs., first half-year. Two sections. M., W., F., Section I, 9:00; II, 10:00. 21 C. Usual prerequisite: Matriculation Chemistry, Subject 12*b*. This course is ordinarily taken in conjunction with Course 3. Prescribed, Freshman year, in the Colleges of Agriculture, Engineering, and Chemistry.

*Absent on leave.

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1A. General Inorganic Chemistry. Associate Professor O'NEILL.

Lectures and recitations, with study of a manual, and full experimental illustration.

2 hrs., throughout the year. Tu., Th., 10:00. 21 C. Prerequisite: at least Sophomore standing.

2. General Inorganic Chemistry—Metals.

Dr. BIDDLE and Mr. BOOTH.

Lectures, with study of a manual, and full experimental illustration.

3 hrs., second half-year. Two sections. M., W., F., Section I, 9:00; II, 10:00. Usual prerequisite: Matriculation Chemistry, Subject 12*b*, and Course 1. This course is ordinarily taken in conjunction with Course 4. Prescribed, Freshman year, in the Colleges of Agriculture, Engineering, and Chemistry.

3. Laboratory: Experiments. Dr. BIDDLE and Mr. BOOTH.

A series of experiments, qualitative and quantitative, illustrating the general laws of chemical action.

6 hrs., first half-year—2 units. Five sections. Section I, M., F., 1:00–4:00; II, Tu., Th., 9:00–12:00; III, Tu., Th., 1:00–4:00; IV, W., 1:00–4:00, S., 9:00–12:00; V, M., W., 8:00–11:00. C. Prerequisite: Matriculation Chemistry, Subject 12*b*. Prescribed, Freshman year, in the College of Agriculture, Engineering, and Chemistry.

4. Laboratory: Qualitative Analysis. Dr. BIDDLE and Mr. BOOTH.

Laboratory practice in qualitative analysis, including blowpipe tests; with occasional lectures and discussions.

6 hrs., second half-year—2 units. Five sections. (See Course 3.) C. Prerequisite: Courses 1 and 3. Prescribed, Freshman year, to all students in the Colleges of Agriculture, Engineering, and Chemistry.

5A. Laboratory: Quantitative Analysis—Gravimetric and Volumetric. (G.E.) Mr. ———.

Elementary course in the principles of quantitative analysis; practice in gravimetric and volumetric analysis, with weekly lectures and discussions.

9 hrs., first half-year—3 units. M., W., F., 1:00–4:00. C. Prescribed, optionally with 5B, in the College of Chemistry. Prerequisite, alternatively with 5B, to Courses 9 to 31.

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5B. **Laboratory: Quantitative Analysis—Gravimetric.** (G.E.)
Dr. BLASDALE.

General principles; practice in gravimetric determinations, with weekly lectures and discussions.

9 hrs., first half-year—3 units. Two sections. Section I, M., W., F., 1:00–4:00; II, Tu., Th., 1:00–4:00; S., 9:00–12:00. C. Prescribed, Sophomore year, in the College of Mining, and, optionally with 5A, to students in the College of Chemistry, and to those in the College of Agriculture who intend to elect work in the Agricultural and Viticultural Laboratories.

6. **Laboratory: Quantitative Analysis—Volumetric.** (G.E.)
Dr. BLASDALE.

General principles, with weekly lectures and discussions.

9 hrs., second half-year—3 units. Two sections. Section I, M., W., F., 1:00–4:00; II, Tu., Th., 1:00–4:00; S., 9:00–12:00. Prerequisite: Course 5A or 5B. Prescribed, Sophomore year, in the College of Mining.

7A. **Inorganic Chemistry.** (G.E.) ——— ———.

Advanced lectures on the chemistry of the metals, designed particularly for mining students.

2 hrs., throughout the year. Tu., Th., 9:00. 25 C.

*7B. **Inorganic Chemistry: Laboratory.** (G.E.) Professor RISING.

A few students will be admitted to this course, and will be assisted in making special preparations of metallic compounds. Competent students will be able to pass to original investigation. The credit value will be fixed in each case.

8. **Organic Chemistry.** (G.E.) Associate Professor O'NEILL.

Elementary introductory course. Lectures and recitations, with experiments.

2 hrs., first half-year. Tu., Th., 9:00. 21 C. Prescribed, Sophomore year, in the College of Chemistry.

9A. **Organic Chemistry.** (G.E.) Dr. MORGAN.

Advanced course. Lectures and recitations, with references to original articles on special topics.

3 hrs., first half-year. M., W., F., 8:00. 25 C. Prerequisite: Course 8.

*Not to be given in 1901–02.

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9B. Organic Chemistry. Dr. MORGAN.

Chemistry of the benzene derivatives and cyclic compounds in general.

3 hrs., second half-year. M., W., F., 8:00. 25 C. Prerequisite: Course 8.

10. Laboratory: Organic. (G.E.) Dr. MORGAN.

Supplementary to Courses 8 and 9. Preparation of organic compounds, and methods of analysis.

9 hrs., either half-year—3 units. M., W., F., 1:00–4:00. C.

10B. Laboratory: Organic. Dr. MORGAN.

Continuation of Course 10.

6 to 15 hrs., either half-year—2 to 5 units.

11. Theoretical Chemistry. (G.E.) ——— ———.

A discussion of the principles of chemistry and the relations of chemistry to physics.

2 hrs., second half-year. Tu., Th., 8:00. 25 C. Prerequisite: Courses 5A or 5B, and 8.

12. Laboratory: Advanced. (G.E.) ——— ———.

A series of laboratory experiments in connection with Course 11.

9 hrs., second half-year—3 units. M., W., F., 1:00–4:00. C.

The following courses, with the exception of Course 29, will ordinarily be given in alternate years, as will be indicated at the beginning of each half-year; but the Department will endeavor to meet any unusual demand that may arise. As a rule, prerequisite to all these, except 28, are courses 1, 2, 3, 4, 5A or 5B, and 8.

During 1901–02 the following courses will be offered: 16, 17A, 18, 21, 23, 24, 26, 28, 29, 30, and 31.

*13. Quantitative Blowpipe Analysis. (G.E.) Professor RISING

Flame reactions and microchemical analysis.

6 hrs., first half-year—2 units. Tu., Th., 1:00–4:00. C.

*14. Gas Analysis and Analysis of Fuels, including Petroleum. (G.E.) Associate Professor O'NEILL.

3 hrs., second half-year—1 unit. S., 9:00–12:00. C.

† Not to be given in 1901–02.

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*15. Electrolysis. (G.E.) ——— ———.

Elements of electro-chemistry developed experimentally, with applications to quantitative analysis. Laboratory practice and occasional lectures.

7 hrs., either half-year—3 units. One hour lecture and six hours laboratory work. Laboratory, Tu., Th., 1:00–4:00. C. Prerequisite: Courses 5A or 5B, and 6; Physics 3.

16. Ore Analysis. (G.E.) Dr. BLASDALE.

Special methods of analysis of minerals and ores of complex composition.

6 hrs., first half-year—2 units. Tu., Th., 1:00–4:00. C. Prerequisite: Courses 5A or 5B, and 6; Physics 3.

*17. Analysis of Iron, Steel, and Alloys. (G.E.) ——— ———.

Technical methods for rapid and accurate determination of important constituents of metals and alloys.

3 hrs., second half-year—1 unit. W., 1:00–4:00. C.

17A. Chemistry of Structural Materials. Mr. BOOTH.

Chemical character and methods of manufacture of materials of construction.

2 hrs., first half-year. Tu., Th., 4:00.

18. Physiological Chemistry. (G.E.) Associate Professor O'NEILL.

Lectures on the chemistry of the animal functions.

2 hrs., first half-year. Tu., Th., 8:00. 25 C. Prerequisite: Course 8.

*19. Physiological Chemistry: Laboratory. (G.E.) Associate Professor O'NEILL.

Preparation of compounds of physiological interest. Supplementary to Course 18.

3 hrs., first half-year—1 unit. W., 1:00–4:00. C.

*20. Toxicology. (G.E.) Associate Professor O'NEILL.

Lectures on the chemistry, detection, and effect of poisons.

2 hrs., second half-year. Tu., Th., 8:00. 25 C. Prerequisite: Course 8.

21. Water Analysis. (G.E.) Associate Professor O'NEILL.

General and special methods of analysis of mineral and potable

*Not to be given in 1901–02.

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waters, including modern methods for determining the sanitary quality of drinking waters. Laboratory work, with weekly lectures.

6 hrs., second half-year—2 units. Tu., Th., 1:00-4:00. C.

*22. Food Analysis. (G.E.) Dr. BLASDALE.

Methods for the complete analysis of the more common foodstuffs, including tests for impurities and adulterations. Laboratory work with weekly lectures.

9 hrs., first half-year—3 units. Tu., Th., 1:00–4:00. C.

23. Thermo-Chemistry. (G.E.) ——— ———.

Lectures, with references to the original literature. For graduates and advanced undergraduates.

2 hrs., first half-year. Tu., Th., 8:00. C.

*23A. Thermo-Chemical Laboratory. (G.E.) Professor RISING.

Credit value to be fixed in each case. For graduates and advanced undergraduates.

*24. Selected Topics in Organic Chemistry. (G.E.) Associate Professor O'NEILL.

Lectures with references to original literature.

1 hr., second half-year. W., 4:00. 25 C. Prerequisite: Courses 5A or 5B, 8, 9A or 9B, and 10.

*25. Explosives. (G.E.) Professor RISING.

2 hrs., second half-year. Tu., Th., 10:00. 25 C.

26. Rare Metals. (G.E.) Mr. BOOTH.

Lectures and discussions on some of the more important rare elements.

1 hr., second half-year. M., 4:00. C. Prerequisite: Course 5A or 5B.

27. History of Chemistry. (G.E.) Associate Professor O'NEILL.

The development of modern chemistry.

1 hr., second half-year. W., 4:00. 25 C. Prerequisite: Courses 5A or 5B, 6, 7, 8, 9A or 9B, 10, 11, 12.

28. Teachers' Course. (G.E.) Mr. BOOTH.

Training course in elementary chemistry, with opportunity for

*Not to be given in 1901–02.

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giving instruction in the elementary laboratory. Lectures and laboratory practice, each twice a week.

2 hrs., either half-year—2 units. Prerequisite: Courses 5A or 5B, 8, 10, 11.

29. Sumner School.

A course of practical laboratory exercises especially adapted to the needs of teachers in the secondary schools of the State, supplemented by lectures upon the principles involved. The session of 1901 will begin June 27 and close August 7.

30. Special Undergraduate Study and Research. (G.E.)

All special laboratory work not included in the courses announced above. Credit value to be fixed in each case.

31. Graduate Course.

Work adapted to the special needs of each student. Credit value to be fixed in each case.

Agricultural Chemistry.

See Agriculture, Horticulture, and Entomology.

Assaying. See under Mining.

Blowpipe Analysis. See under Mineralogy.

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BOTANY.

WILLIAM A. SETCHELL, Ph.D., Professor of Botany.

W. L. JEPSON, Ph.D., Assistant Professor of Botany.

W. J. V. OSTERHOUT, Ph.D., Assistant Professor of Botany.

J. BURTT DAVY, Assistant in Botany, and Assistant Botanist to Agricultural Experiment Station.

N. L. GARDNER, B.S., Assistant in Botany.

The Group Elective. Physics, Courses 1 and 2A, and Chemistry, Courses 1 to 4 inclusive, are prerequisite to the Group Elective in this department.

Laboratory deposits are five dollars per half-year for each laboratory course. The average amount returned to the student at the end of the half-year, after deducting for cost of materials actually used and for breakage of apparatus, is about two dollars and fifty cents.

1. **Fundamentals of Botany.** Professor SETCHELL.

Lectures, illustrated as far as possible by means of specimens, diagrams, and preparations, designed to set forth in a general way the important facts, problems, and theories with which botanical science is concerned.

3 hrs., first half-year. Two sections. M., W., F., 8:00; Tu., Th., S., 9:00. O. Prescribed, Sophomore year, in the College of Agriculture; Free Elective in other colleges.

2. **General Plant Morphology.**

Assistant Professor JEPSON and Mr. GARDNER.

Laboratory practice on selected material to illustrate the general facts of the morphology and the simpler physiology of plants. In general the work will follow the outline given in Setchell's Laboratory Practice for Beginners in Botany, but will be supplemented by additional work, both in the laboratory and field, by lectures and reading references.

3 hrs., second half-year. Laboratory practice: Tu., Th., S., Section I, 8:00; II, 9:00. 2 B. Occasional lectures (for both sections), S., 8:00, taking the place of the laboratory practice when they occur. Field-work, one hour per week; Tu., Th., F., 4:00. Prescribed, Sophomore year, in the College of Agriculture. Free elective in other colleges.

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2A. Vegetable Physiology. Assistant Professor OSTERHOUT.

The facts and theories relating to absorption, conduction, metabolism, storage, secretion, growth, irritability, protection, and reproduction will be treated in a series of lectures accompanied by demonstrations and reading references.

3 hrs., second half-year. M., W., F., 9:00. O. Prerequisite: Course 1.

3. General Phænogamic Botany. (G.E.)
Assistant Professor JEPSON.

Laboratory work on the special morphology of the higher orders of seed plants, including such groups as Ranunculaceæ, Papaveraceæ, Cruciferæ, Leguminosæ, Rosaceæ, Scrophulariaceæ, Lobeliaceæ, and Compositæ; accompanied by lectures on the general relationships of the orders studied.

5 hrs., first half-year—3 units. Tu., Th., 8:00; W., 1:00–3:00. 2 B. Prerequisite: Course 2.

4. Apetalæ and Endogens. (G.E.) Assistant Professor JEPSON.

The special morphology, classification, and relationships of *(a)* Gymnosperms (pines and their allies); *(b)* the more important types of Monocotyledons; *(c)* the ament-bearing trees (oaks, alders, walnuts, willows, etc.). Weekly reports on field-work to be a part of the requirement.

1 hr. recitation or lecture, 3 hrs. laboratory, 4 hrs. field-work—3 units, second half-year. Recitation or lecture, F., 10:00; laboratory, W., 1:00–4:00. 2 B. Prerequisite: Course 2.

5. General Cryptogamic Botany. (G.E.)
Professor SETCHELL and Mr. GARDNER.

The lower cryptogams (algæ, fungi, and lichens) will be studied during the first half-year, and the higher cryptogams (hepatics, mosses, ferns, and fern allies) during the second half-year. Records of the work will be kept in the form of careful notes, drawings, and microscopical preparations. Informal lectures will accompany the laboratory work.

6 hrs. laboratory, 1 hr. lecture, throughout the year—3 units each half-year. Tu., Th., 1:00–4:00. 2 B. Prerequisite: Course 2.

6. Phycology and Mycology. (G.E.) Professor SETCHELL.

Laboratory work upon the structure, development, and classification of the algæ, fungi, and lichens, with informal lectures and the assignment of outside reading. Intended for students who

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desire some critical knowledge of the lower crytogamous orders. To be offered in alternate years.

6 hrs., throughout the year—3 units each half-year. Hours to be arranged with the instructor. 1 B. Prerequisite: Course 5.

*7. **Pteridology and Bryology.** (G.E.) Professor SETCHELL.

The structure, development, and classification of the higher cryptogams (hepatics, mosses, ferns, and fern allies) will be treated in the same way as the lower cryptogams in Course 6. To be offered in alternate years.

6 hrs., throughout the year—3 units each half-year. W., F., 9:00–12:00. 1 B. Prerequisite: Course 5.

8. **Economic Botany (Agricultural and Commercial).** (G.E.) Mr. DAVY.

Lectures on the uses of plants and the principal properties of the most important natural orders; illustrated by specimens or diagrams and samples of plant products. The oils and drugs collected in the museum of the Chemical Laboratory, the grains, fruits, fodders, and fibers in the Agricultural Building, and the living plants in the economic garden of the Experiment Station are available for purposes of demonstration.

2 hrs., second half-year. Tu., Th., 4:00. 1 A. Prerequisite: Courses 2 and 3.

*8A. **Weeds and Seed Testing.** (G.E.) Mr. DAVY.

Lectures on the structural characteristics of seeds, with practical work in the laboratory on the testing of seeds for germinating power, adulterants, and weed seeds.

3 hrs., first half-year—2 units. M., 1:00–4:00. 9 B. Prerequisite: Courses 2 and 3. To be offered in alternate years.

8B. **Forage Plants (Agrostology).** (G.E.) Mr. DAVY.

Laboratory work on the special morphology, classification, and ecology of the Gramineæ and other forage plants of the Pacific Slope, accompanied by informal lectures on the relative agricultural value of the different species studied.

3 hrs., first half-year—2 units. M., 1:00–4:00. 9 B. Prerequisite: Courses 2 and 3. To be offered in alternate years.

9. **Vegetable Histology.** (G.E.) Assistant Professor OSTERHOUT.

A laboratory course in the microscopical anatomy of the higher plants, including practice in imbedding, use of the microtome,

*Not to be given in 1901-02.

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staining on the slide, microchemical tests, etc. Laboratory work and lectures.

6 hrs., throughout the year—3 units each half-year. M., F., 1:00–4:00. 2 B. Prerequisite: Courses 1, 2, and 2A.

11. Vegetable Cytology. (G.E.) Assistant Professor OSTERHOUT.

The anatomy and physiology of the cell, including cell-division, chromosome reduction, fertilization, and a consideration of heredity and development from the standpoint of cytology. Laboratory work and lectures.

6 hrs., throughout the year—3 units each half-year. M., F., 1:00–4:00. 1 B. Prerequisite: Course 9.

12. Morphology of the Compositæ. (G.E.)
Assistant Professor JEPSON.

This course, which includes studies in the general morphology of the group, followed by the critical examination of various West American genera and species, is designed for those who, having completed Courses 3 and 4, desire to obtain special knowledge of one of the more difficult orders.

5 hrs., first half-year—2 units. Tu., Th., 9:00; W., 1:00–4:00. To be offered in alternate years.

*13. Taxonomy and Phylogeny of the Phænogams. (G.E.)
Assistant Professor JEPSON.

Lectures and laboratory work on the classification of the seed plants, considering the characters and affinities of the classes and more important orders, with special discussions of phylogenetic problems.

6 hrs., first half-year—2 units. Tu., Th., 9:00; W., 1:00–4:00. Prerequisite: Courses 3, 4, and 5. To be offered in alternate years.

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14. Advanced Cryptogamic Botany. Professor SETCHELL.

The cryptogams of California offer exceptional opportunities for research, and many simpler problems are presented for original investigation. This work during the year will be confined almost exclusively to the algæ, in connection with the special work of the instructor. Students should expect to devote considerable time to this course.

*Not to be given in 1901–02.

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15. Advanced Phænogamic Botany. Assistant Professor JEPSON.

Graduate students, qualified to undertake such work, will be assigned special problems requiring the original investigation of some particular order or smaller group of flowering plants. Considerable work in the field as well as in the laboratory will be required.

16. Advanced Histology and Cytology.

Assistant Professor OSTERHOUT.

Special problems in histology or cytology will be assigned to properly prepared graduate students. M., F., 1:00–4:00.

18. Advanced Economic Botany. Mr. DAVY.

Special problems in agrostology (either systematic or economic) and other branches of economic botany.

3 hrs., throughout the year—2 units each half-year. M., 1:00–4:00. Prerequisite: Courses 2, 3, 8, and 8B.

17. Botanical Seminary.

Professor SETCHELL,

Assistant Professors JEPSON and OSTERHOUT.

Graduates and advanced Undergraduates meet every two weeks for the discussion of special topics. During the year 1900–01 the time was devoted to the study of variation. In 1901–02 the time will be spent in discussing several similar topics of present botanical importance.

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* Not to be given in 1901–02.

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ZOOLOGY.

W. E. RITTER, Ph.D., Associate Professor of Zoölogy.

C. A. KOFOID, Ph.D., Assistant Professor of Histology and Embryology.

JOHN C. MERRIAM, Ph.D., Assistant Professor of Palæontology and Historical Geology.

FRANK W. BANCROFT, Ph.D., Instructor in Physiology.

H. B. TORREY, M.S., Instructor in Zoölogy.

The courses are planned to meet the needs of three classes of students, viz.:

(1) Those who wish, for the purposes of general culture, some knowledge of the subject-matter, methods, and generalizations of biological science on its animal side. For this class Courses 1A and 1B are particularly designed.

(2) Those preparing to become students and investigators. For such the individual aims of the students will determine, after the fundamental courses have been taken, what advanced courses he shall select. The minimum for the Teacher's Recommendation is 1A, 1B, either 4 or 5, and 17.

(3) Those preparing for the study of medicine. For these, Courses 1A, 1B, 4, 5, 6, 20, and 21 are requisite to fulfil the requirements of the Course Preparatory to Medicine.

Laboratory deposits, to cover cost of materials actually used and breakage of apparatus, are five dollars for Courses 1B, 5, 6, 21, and 23.

The Group Elective. Physics, Courses 1 and 2A; Chemistry, Courses 1 to 4 inclusive, and Zoölogy 1A are prerequisite to the Group Elective in this department.

1A. **The Fundamentals of Zoology.** Associate Professor RITTER.

The underlying principles of animal life and evolution. The treatment is topical rather than systematic. Lectures and demonstrations.

2 hrs., throughout the year. Tu., Th., 11:00. The course must be taken in conjunction with 1B by those expecting to pursue zoölogy further, and all students electing 1A should, if possible, elect 1B also.

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1B. General Zoological Laboratory. (G.E.) Mr. TORREY.

Supplementary to, and given concurrently with, Course 1A.

6 hrs., throughout the year—2 units each half-year. Section I, M., F., 1:00–4:00; II, Tu., Th., 1:00–4:00; III, W., 1:00–4:00, S., 9:00–12:00.

4. Structure and Affinities of the Mammalia. (G.E.)
Associate Professor RITTER and Assistant Professor MERRIAM.

A continuation of Course 1. Designed largely for students preparing to study medicine. The osteological part of the work is done by Assistant Professor MERRIAM. (See Geology, Course 11.)

8 hrs., first half-year—4 units. Tu., W., Th., 1:00–4:00, and S., 8:00–12:00. Laboratory work, recitations, and assigned topics; allotment of time for each to be arranged with the class.

5. Microscopical Anatomy. (G.E.) Assistant Professor KOFOID.

An introduction to the study of animal tissues. Special stress will be laid on the functional activities of the various tissues composing the animal body. The laboratory work (six hours a week) consists of the study of prepared specimens, together with practice in the methods of preserving, staining, sectioning, and mounting tissues for microscopical study. The lectures and recitations occupy three hours a week.

9 hrs, first half-year—5 units. M., W., F., 9:00; M., F., 1:00–4:00. Prerequisite: Courses 1A and 1B.

6. Embryology. (G.E.) Assistant Professor Kofoid.

The phenomena of animal development, fundamental facts of reproduction, comparative vertebrate embryology, and the complete embryonal history of one of the higher vertebrates. Lectures, recitations, and laboratory.

9 hrs., second half-year—5 units. M., W., F., 9:00; M., F., 1:00–4:00. Prerequisite: Course 5.

6A. Lectures on Embryology. Assistant Professor KOFOID.

Course 6 may be taken as a free elective by students not in the preparatory medical course and not taking zoölogy as Group Elective. Demonstrations and papers.

5 hrs., second half-year—3 units. M., W., F., 9:00; M., F., 1:00. Prerequisite: Courses 1A and 1B.

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7. **Advanced Invertebrate Zoology.** (G.E.)
Assistant Professor KOFOID.

An extension of the work done in Courses 1A and 1B. Lectures, papers on selected topics, and field and laboratory work, with especial attention to the local fauna.

4 hrs.—3 units, first half-year. S., 8:00–12:00, with additional time (to be arranged) for field excursions. Prerequisite: Courses 1A and 1B.

8. **Seaside Laboratory.**

During the summer vacations, work in zoölogy is transferred to the seashore, and, as far as possible, the work done there is made an integral part of the work of this department of the University. During the summer of 1901 the laboratory will be located at San Pedro, California.

9. **Some Problems of Growth, Differentiation, and Reproduction.**
Associate Professor RITTER.

2 hrs., second half-year. For Graduates only. Given in alternate years, at the option of the instructor.

10. **Research Work.** (G.E.)
Associate Professor RITTER, Assistant Professor KOFOID, and Dr. BANCROFT.

Original study on special topics, in the field and laboratory.

12. **Zoological Seminary.** (G.E.) Mr. TORREY.

Designed for the discussion of special topics, and to familiarize students with the most important contemporaneous advances in this field of science. A reading knowledge of German or French is essential.

1 hr., throughout the year. Hours to be arranged with the students. The fitness of students for this course will be determined in each case.

17. **Advanced General Vertebrate Zoology.** (G.E.)
Associate Professor RITTER.

An extension of the work done in Courses 1A and 1B. The course is particularly designed, both in its methods and in its subject-matter, for those seeking the Teacher's Recommendation in Zoölogy. Recitations, field, and laboratory work, and papers on assigned topics.

3 units, second half-year. S., 8:00–12:00. Prerequisite: Courses 1A and 1B.

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Entomology. See Agriculture, Horticulture, and Entomology.

Palæontology. See Courses 5, 5A, 6A, under Geology.

PHYSIOLOGY.

20. **General Physiology.** (G.E.) Dr. BANCROFT.

Lectures on the activities common to all living substance, together with recitations on the more important problems of vertebrate physiology. Demonstrations will accompany the lectures wherever possible.

3 hrs., second half-year. M., W., F., 9:00. When taken as Group Elective or as part of the course preparatory to medicine, this course must be accompanied by 21; as Free Elective it may be taken independently of 21. Prerequisite: Courses 1A, 1B, and matriculation Physics and Chemistry. Physics 1 and 2A, Chemistry 1, 2, 3, and 4, and Zoölogy 5, also, are highly desirable.

21. **Physiological Laboratory.** (G.E.) Dr. BANCROFT.

The work will be divided into three parts: (*a*) Chemistry of organisms; (*b*) Response of organisms to stimuli; (*c*) Muscle, nerve, and heart physiology.

6 hrs., second half year—2 units. Tu., Th., 1:00–4:00. To be taken concurrently with Course 20. Prerequisite: The same as for Course 20.

22. **Advanced Physiology.** (G.E.) Dr. BANCROFT.

A continuation of that part of Course 20 dealing with the activities characteristic of all organisms, such as growth, differentiation, and regeneration. Lectures, recitations, and demonstrations.

2 hrs., first half-year. Tu., Th., 9:00. To be taken with Course 23 if it is intended to count as part of the course preparatory to medicine or as Group Elective. Prerequisite: Course 20.

23. **Advanced Physiological Laboratory.** (G.E.) Dr. BANCROFT.

An introduction to research in physiology consisting of a rather detailed examination of some of the problems discussed in Course 22.

6 hrs., first half-year—3 units. Tu., Th., 1:00–4:00. To be taken with Course 22. Prerequisite: Courses 20 and 21.

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GEOLOGY.

ANDREW C. LAWSON, Ph.D., Professor of Geology and Mineralogy.

JOHN C. MERRIAM, Ph.D., Assistant Professor of Palæontology and Historical Geology.

JOHN A. REID, B.S., Assistant in Geology.

There are no laboratory deposits in this department.

The Group Elective. Prerequisite to the Group Elective are Courses 1 and 2A in Physics, and Courses 1 to 4, inclusive, in Chemistry.

1A. General Geology: Dynamical and Structural.

Professor LAWSON.

Lectures.

3 hrs., first half-year. M., W., F., 10:00. Prerequisite: Elementary Chemistry and Physics. Prescribed, Junior year, in the Course in Sanitary Engineering, and Senior year in the Course in Railroad Engineering, College of Civil Engineering; and Junior year, in the College of Mining.

1B. General Geology: Historical. (G.E.)

Assistant Professor MERRIAM.

Lectures.

2 hrs., second half-year. Tu., Th., 10:00. Prerequisite: Course 1A or 5.

12. Physical Geology of North America. (G.E.)

Professor LAWSON.

Lectures.

2 hrs., first half-year. Prerequisite: Course 1A in Geology and Course 1 in Mineralogy.

2. Field Geology. (G.E.) Professor Lawson.

An inquiry by the student into the geological conditions which obtain in the region around the Bay of San Francisco, with occasional more extended excursions to points of especial interest; training in methods of field-observation and in interpretation of results.

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1 unit, first half-year; 2 units, second half-year. Year course. Fifteen field-days during the year. Prerequisite: Course 1A in Geology; Course 1 in Mineralogy. Prescribed, Senior year, in the College of Mining. Students taking this course may be called upon to make excursions entailing an outlay for traveling expenses of $20.00.

2A. Economic Geology. (G.E.) Professor LAWSON.

Lectures.

3 hrs., second half-year. M., W., F., 10:00. Prerequisite: Geology 1A and Mineralogy 1. Prescribed, Senior year, in the College of Mining.

3. Petrography. (G.E.) Professor LAWSON.

Principles and methods of investigation of rock-forming substances, with special discussion of the most important ones. General petrology. Systematic petrography.

2 hrs., first half-year. Tu., Th., 11:00. Prerequisite: Course 1A; Courses 2 and 2C in Mineralogy. Prescribed, Senior year, in the College of Mining.

4. Petrographical Laboratory. (G.E.)
Professor LAWSON and Mr. REID.

(*a*) Demonstrations of the different methods of investigation of the rock-forming minerals and rocks. (*b*) Practice in the determination of rocks by modern petrographical methods; preparation of thin sections, and use of the polarizing microscope.

3 hrs., first half-year—1 unit; 6 hrs., second half-year—2 units. Section I, M., 1:00–4:00; II, W., 1:00–4:00. Prerequisite: Course 1A in Geology; Courses 2A, 2B, and 2C in Mineralogy. Prescribed, Senior year, in the College of Mining.

5. General Palæontology. Assistant Professor MERRIAM.

The general principles of the study of fossil organisms, with a discussion of the general morphology, origin, affinities, and occurrence of the most important forms.

2 hrs., first half-year. Tu., Th., 10:00. Preparatory to Geology 1B. Prerequisite: Zoölogy 1A.

5A. Palæontological Laboratory. (G.E.)
Assistant Professor MERRIAM.

Given in connection with Course 5. A study, principally from the biological standpoint, of the most important extinct forms.

4 hrs., first half-year—2 units. M. or W., 1:00–5:00. Open to students taking Course 5.

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6A. **Practical Work on Palæontologic Geology.** (G.E.)
Assistant Professor MERRIAM.

Given in connection with Course 1B. Laboratory work and excursions. For the purpose of studying the fossils and geological horizons of the Coast Ranges in the field, excursions to points of interest near Berkeley are made on convenient Saturdays during the term.

4 hrs., second half-year—2 units. (1 unit laboratory, 1 unit excursion.) Open to students who have completed or are taking Course 1B.

11. **Vertebrate Palæontology.** (G.E.)
Assistant Professor MERRIAM.

Comparative osteology, history, and affinities of the most important types of recent and fossil vertebrates.

3 hrs., first half-year. Lectures, M., W., 9:00; laboratory work, W. or F., 1:00–4:00. Prerequisite: Course 5 in Geology, or Course 1A in Zoölogy.

14. **Geological History of Man.** Assistant Professor MERRIAM.

1 hr., second half-year. Tu. 1:00. Prerequisite: Course 5 or 1B.

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8. **Advanced Palæontologic Laboratory.** (G.E.)
Assistant Professor MERRIAM.

Studies in lines of descent. Practical work in the palæontology and organic geology of California.

Throughout the year. Credit value to be determined in each case. Prerequisite: Course 5A or 11.

10. **Inorganic Geology.** (G.E.) Professor LAWSON.

Discussions of special topics and advanced problems. Critical reviews of current literature. Prosecution of original geological research and publication of results. Methods of geological surveying and cartography. Petrographical studies.

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MINERALOGY.

ANDREW C. LAWSON, Ph.D., Professor of Geology and Mineralogy.

ARTHUR S. EAKLE, Ph.D., Instructor in Mineralogy.

A laboratory deposit of five dollars per year is required for Course 1, to cover cost of materials actually used and breakage of apparatus. Deposits are not required for other courses in this department.

The Group Elective. Prerequisite to the Group Elective are, in addition to Course 1 in Mineralogy, Courses 1 and 2A in Physics.

1. **Mineralogical Laboratory.** Dr. EAKLE.

The course comprises two parts: *(a)* Practice in the determination of unlabeled minerals by means of their physical properties, the apparatus consisting of pen-knife, pocket lens, streak plate, magnet, and acid bottle. The object is to give the student sufficient familiarity with the most commonly occurring minerals of geological and economic importance to enable him to recognize or determine them in the field without delay. *(b)* The latter half of the course is devoted to the determination of minerals by blowpipe analysis.

6 hrs., throughout the year—two units each half-year. Two sections. Tu., Th., 9:00–12:00, 1:00–4:00. Prerequisite: Courses 1A and 3 in Chemistry. Elective, College of Civil Engineering, with Mechanical Engineering 8 or Drawing 8A. Prescribed, Sophomore year, in the College of Mining, to the extent of 1 unit each half-year.

2A. **Crystallography.** (G.E.) Dr. EAKLE.

The morphology of minerals.

2 hrs., first half-year. Tu., Th., 2:00. Prerequisite: Course 1. Prescribed, Junior year, in the College of Mining.

2B. **Crystallographic Laboratory.** (G.E.) Dr. EAKLE.

2 hrs., first half-year—1 unit. Tu., Th., 3:00. Concurrent with Course 2A, and open only to students who are taking that course.

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2c. **Physical Properties of Minerals.** (G.E.) Professor LAWSON.
Lectures.

1 hr., second half-year. Th., 11:00. Prerequisite: Course 2A. Prescribed, Junior year, in the College of Mining.

3. **Descriptive Mineralogy.** (G.E.) Dr. EAKLE.

A discussion of the salient properties and mode of occurrence of the more important minerals, with a classification of the same in natural groups; illustrated by typical specimens.

2 hrs., second half-year. M., W., 10:00. Prerequisite: Course 2A. Prescribed, Junior year, in the College of Mining.

5. **Graduate Course.** Dr. EAKLE.

Studies in the goniometrical investigation of crystals and in the determination of their physical constants. The acquiring of a wider and more thorough knowledge of minerals than is possible in the undergraduate courses.

Petography. See Courses 3 and 4 under Geology.

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MECHANICAL AND ELECTRICAL ENGINEERING.

F. G. HESSE, Professor of Hydraulics.

CLARENCE L. CORY, M.M.E., Professor of Electrical Engineering.

J. N. LECONTE, M.M.E., Instructor in Mechanical Engineering.

W. A. LYNN, B.S., Instructor in Electrical Engineering.

C. C. MAJOR, M.E., Instructor in Steam Engineering.

J. D. MORTIMER, B.S., Assistant in Electrical Engineering.

GEORGE E. COX, Assistant in Mecanhics and Foreman in Woodwork.

——— ———, Assistant in Mechanics and Foreman in Machine Work.

OSCAR SCHOBER, Assistant in Mechanics and Mechanician.

There are no laboratory deposits in this department.

2A. Hydrodynamics. Professor HESSE.

Investigation of the action of forces producing equilibrium or motion in liquids; pressure, stability, flow, etc., as affected by gravity, inertia, outer and inner friction. General theory and construction of hydraulic motors and pumping machinery.

3 hrs., first half-year. M., W., F., 9:00. Prerequisite: Physics 5. Prescribed, Senior year, in the Engineering Colleges.

2B. Hydrodynamics: Problems. Mr. LECONTE.

2 hrs., first half-year. Tu., Th., 11:00. Prescribed, Senior year, in the Course in Mechanical Engineering, College of Mechanics.

3A. Hydraulics and Hydraulic Machinery. Professor HESSE.

Discussion of such machines and apparatus as operate through the agency of fluids, either in modifying motion or transmitting power.

3 hrs., second half-year. M., W., F., 9:00. Prescribed, Senior year, in the College of Mechanics.

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3B. Hydraulics and Hydraulic Machinery: Problems.
Mr. LeConte.

2 hrs., second half-year. Tu., Th., 11:00. Prescribed, Senior year, in the Course in Mechanical Engineering, College of Mechanics.

4A. Kinematics. Mr. LeConte.

Theoretical: Treatment of motion without reference to the cause which produces it, comprehending the study of pure mechanism, or the mutual dependence of the movements in the parts of a machine. *Applied:* Application of the preceding to the various kinematic problems connected with machine-design and construction, such as link-motion, tronsmission by rolling and sliding contact, teeth of wheels, cams, form and proportions of the steam-engine and other motors.

2 hrs., throughout the year. W., F., 8:00. Prescribed, Senior year, in the College of Mechanics.

4B. Kinematics. Mr. LeConte.

Draughting and designing.

3 hrs., second half-year—1 unit. F., 1:00–4:00. Prerequisite: Physics 5. Prescribed, Senior year, in the College of Mechanics.

5A. Thermodynamics. Mr. Major.

Mechanical theory of heat and its application to the theory and construction of motors; of steam, gas, and hot-air engines; of ice-machines; and of air compressors for transmission of power.

3 hrs., first half-year. M., W., F., 10:00. Prerequisite: Physics 5. Prescribed, Senior year, in the College of Mechanics.

5B. Dynamics of Heat Engines. Mr. Major.

Analysis and construction of steam, gas, and hot-air engines; refrigerators, air-compressors, motors for transmission of power, etc.

3 hrs., second half-year. M., W., F., 10:00. Prerequisite: Physics 5. Prescribed, Senior year, in the College of Mechanics.

7A. Mechanical Laboratory: Experimental Engineering.
Mr. LeConte.

Experiments in hydraulics.

6 hrs., throughout the year—2 units each half-year. Tu., Th., 1:00–4:00. Prescribed, Senior year, in the Course in Mechanical Engineering, College of Mechanics.

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7B. Mechanical Laboratory: Experimental Engineering. Mr. MAJOR.

Experiments in steam engineering.

6 hrs., throughout the year—2 units each half-year. Tu., Th., 1:00–4:00. Prescribed, Senior year, in the Course in Mechanical Engineering, College of Mechanics.

8A. Mechanical Practice. Mr. Cox and Mr. ———.

Construction of machines and apparatus designed in Course 4, mainly for use in the laboratories; requiring pattern-making, forging, moulding, and machine work.

6 hrs., first half-year—2 units. Section I, Tu., Th., 1:00–4:00; II, Tu., Th., 9:00–12:00. Prescribed, Sophomore year, in the College of Mechanics.

8B. Mechanical Practice. Mr. Cox and Mr. ———.

Continuation of Course 8A.

6 hrs., second half-year—2 units. Elective, Sophomore year, in the College of Mechanics.

9A. Mechanical Practice. Mr. Cox and Mr. ———.

Continuation of Course 8B.

6 hrs., first half-year—2 units. Section I, M., F., 1:00–4:00; II, W., S., 9:00–12:00. Prescribed, Junior year, in the College of Mechanics.

9B. Mechanical Practice. Mr. Cox and Mr. ———.

Continuation of Course 9A.

6 hrs., second half-year—2 units. Section I, Tu., Th., 1:00–4:00; II, M., F., 1:00–4:00. Elective, Junior year, in the College of Mechanics.

10A. Electrical Machinery and Construction. Professor CORY.

Discussion of the construction and operation of electrical machinery, and its application to electric lighting and power distribution. The location and construction of electric lighting and power systems for cities, street railways, and mines.

2 hrs., throughout the year. Tu., Th., 11:00. Prerequisite: Mathematics 3B and Physics 2A and 3. Prescribed, Junior year, in the College of Mechanics.

10B. Electrical Machinery and Construction. Mr. LYNN.

Laboratory tests.

3 hrs., second half-year—1 unit. This course cannot be taken except in conjunction with Course 10A. Prescribed, Junior year, in the College of Mechanics.

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11A. Alternating Currents and Alternating-Current Machinery.
Mr. MORTIMER.

The theory of the generation of single-phase and polyphase alternating currents, the use of the complex quantity, and the calculation of the regulation and behavior of alternating-current apparatus and transmission lines.

4 hrs., first half-year. Tu., Th., 8:00–10:00. Prescribed, Senior year, in the Course in Electrical Engineering, College of Mechanics. Prerequisite: Courses 10A and 10B and Physics 5 and 7.

11B. Alternating Currents and Alternating-Current Machinery.
Mr. MORTIMER.

The theory of the single-phase and polyphase induction motor, synchronous motor and rotary converter, and their effects and operation in transmission systems.

4 hrs., second half-year. Tu., Th., 8:00–10:00. Prerequisite: Course 10A and 10B and Physics 5 and 7. Prescribed, Senior year, in the Course in Electrical Engineering, College of Mechanics.

11C. Alternating Currents and Alternating-Current Machinery: Laboratory. Mr. LYNN.

Practice in the laboratory, illustrating the work of the class-room.

6 hrs., throughout the year—2 units each half-year. Section I, M., Tu., 1:00–4:00; II, Th., F., 1:00–4:00. Prerequisite: Courses 10A and 10B, and Physics 5 and 7. Prescribed, Senior year, in the Course in Electrical Engineering, College of Mechanics.

12A. Electrical Engineering. Professor CORY.

Discussion of the design, equipment, and management of electrical stations, and the long-distance transmission of power by electricity.

1 hr., throughout the year. Tu., 10:00. Prescribed, Senior year, in the Course in Electrical Engineering, College of Mechanics.

12B. Electrical Engineering: Seminary. Professor CORY.

Critical discussion of special electrical installations.

2 hrs., throughout the year. Primarily for Graduates.

12C. Electrical Engineering: Laboratory. Professor CORY.

Special tests and laboratory work.

Hours and credit value to be arranged. Primarily for Graduates.

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CIVIL ENGINEERING.

FRANK SOULÉ, Graduate U. S. Military Academy, Professor of Civil Engineering.

HERMANN SCHUSSLER, Honorary Professor of Water-Supply Engineering.

H. I. RANDALL, B.S., Assistant Professor of Civil Engineering.

L. E. HUNT, B.S., Instructor in Civil Engineering.

A. E. CHANDLER, B.S., Instructor in Civil Engineering.

———, Instructor in Civil Engineering.

J. H. STUTT, B.S., Graduate Assistant in Civil Engineering.

Laboratory deposits are five dollars per half-year for each laboratory course. The average amount returned to the student at the end of the half-year, after deducting for cost of materials actually used and for breakage of apparatus, is about three dollars.

COURSES FOR UNDERGRADUATES.

1A. Surveying. Mr. HUNT, Mr. CHANDLER, and Mr. ———.

Theory of surveying; modern surveying instruments; methods employed in topographic, land, city, mining, and hydrographic surveys, and in making maps and calculations from field-notes. Full illustration by practical problems. Lectures and recitations.

2 hrs., throughout the year—2 units. Sections I and II, M., F., 8:00; III and IV, M., F., 9:00. Prerequisite: Mathematics 3A. Prescribed, Sophomore year, in the Engineering Colleges.

1B. Field Practice and Mapping. Mr. CHANDLER.

The adjustment of surveying instruments in the field; taking of notes for plane and topographical surveys and making of maps from them; to illustrate the theoretical work of the class-room. Completed maps of all surveys will be required.

3 hrs., throughout the year—1 unit each half-year. Open to students who have taken, or are taking, Course 1A. Prescribed, Sophomore year, in the Engineering Colleges.

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1c. Topographical Drawing and Lettering. Mr. CHANDLER.

Lettering and conventional signs for topography with brush and pen.

3 hrs., second half-year—1 unit. Prescribed, Sophomore year, in the College of Civil Engineering.

2a. Railway, Highway, and Canal Surveying.
Assistant Professor RANDALL.

Methods of making reconnaissance, preliminary, and location surveys for railways, highways, and canals; analytical and graphical calculations of earthwork, masonry, etc. Full illustration by practical problems. Lectures and recitations.

3 hrs., first half-year—3 units. M., W., F., 9:00. 6 MC. Prerequisite: Courses 1a and 1b. Prescribed, Junior year, in the College of Civil Engineering, to students who elect the Course in Railroad Engineering.

2b. Railroad Field Practice and Mapping. Mr. CHANDLER.

The most simple parts of railroad surveying, such as running in curves, laying out sidings, etc., and mapping the same.

6 hrs., first half-year—2 units. M., F., 1:00–4:00. Prescribed, Junior year, in the College of Civil Engineering, to students who elect the course in Railroad Engineering.

2c. Engineering Office Practice. Mr. CHANDLER.

The plotting of profiles and cross sections; calculation of areas and volumes in masonry and earthwork; determination of areas by planimeter; tracing of maps and plans; draughting of timber and masonry structures from field-notes.

3 hrs., second half-year—1 unit. M., 1:00–4:00. MC. Elective, Junior year, in Engineering Colleges.

3. Summer School in Field Practice and Mapping.
Mr. HUNT and Mr. CHANDLER.

For four weeks immediately following Commencement, an extended survey of a suitable tract in the vicinity of Berkeley is made. A camp is established in the country, and work is carried on, as far as possible, just as it is in actual practice; and theoretical study is more fully illustrated by continuous field-work than it can be during the regular university term. A general survey, illustrating methods of topographic, city, and mine surveying, is followed by the running of a railroad line, illustrating methods of making preliminary location and construction surveys. All field-notes are completely worked up in the office, and embodied in maps, computations, etc.

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Prerequisite: Courses 1A and 1B. Prescribed, at the end of the Sophomore year, in the College of Mining, and at the end of the Sophomore and Junior years, in the College of Civil Engineering.

4. Railroad Economics. Assistant Professor RANDALL.

Discussion of the theory of economic location and construction of railroads, based upon a study of operating expenses, rise and fall, distance, alignment, grades, etc.

3 hrs., second half-year—3 units. Tu., W., Th., 9:00. 6 MC. Prerequisite: Course 2A. Prescribed, Junior year, in the College of Civil Engineering, to students who elect the course in Railroad Engineering.

5. Higher Surveying. Mr. HUNT.

Discussion of the figure of the earth, the measurement of base lines, and the methods of observing and making reductions in triangulation, mapping of large areas, trigonometric and precise spirit leveling.

2 hrs., second half-year—2 units. Tu., Th., 8:00. 18 MC. Prerequisite: Courses 1A and 1B; Mathematics 3B and 10; Astronomy 7 and either 4A or 4B. (Also open to students who take Astronomy 4A or 4B concurrently, and who have the other prerequisites.) Prescribed, Senior year, in the College of Civil Engineering, to students who elect the course in Railroad Engineering.

6. Highways and Pavements. Assistant Professor RANDALL.

Principles underlying the construction and maintenance of county roads and city streets and pavements.

2 hrs., second half-year—2 units. Tu., Th., 9:00. 6 MC. Prescribed, Senior year, in the College of Civil Engineering.

7A. Framed Structures. Assistant Professor RANDALL.

The computation of stresses in roofs and simple bridge trusses, both by analytical and by graphical methods; discussion of the different methods of loading bridges, and the more important details of construction. Full illustration by practical problems.

3 hrs., second half-year—3 units. M., W., F., 10:00. 6 MC. Open to students who have taken, or who are taking, Course 8. Prescribed, Junior year, in the College of Civil Engineering.

7B. See Course 14.

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7c. Structural Design. Assistant Professor RANDALL.

This course consists in making detail designs of several structures, such as roof and bridge trusses, plate girders, etc.

9 hrs., throughout the year—3 units each half-year. M., W., F., 1:00–4:00. Prerequisite: Course 7A. Prescribed, Senior year, in the College of Civil Engineering.

8A. Strength of Materials. Professor SOULÉ.

Properties and characteristics of the materials used in construction. Discussion of the elastic and the ultimate resistances of these materials; of the best methods in designing parts of structures, such as suspension rods, pillars, girders, and shafts; and of parts of uniform strength. Both analytical and graphical methods are used in demonstration. Lectures and problems.

4 hrs., second half-year—4 units. Tu., Th., 9:00–11:00. 18 MC. Prerequisite: Thoroughly satisfactory standing in the first half-year of Analytic Mechanics. Prescribed, Junior year, in the Colleges of Mechanics, Mining, and Civil Engineering.

8B. Civil Engineering Laboratory. Professor SOULÉ and Mr. HUNT.

Supplementary to Course 8A. Machine tests of limes, cements, mortars, concretes, building-stones, etc.

3 hrs., second half-year—1 unit. W., 1:00–4:00. MC. Prerequisite: Course 8D. Prescribed, Junior year, in the College of Civil Engineering.

8C. Advanced Course in Strength of Materials.
Professor SOULÉ and Mr. HUNT.

Supplementary to Course 8A. Lectures and laboratory machine tests of timber, metals, etc.

6 hrs., first half-year—3 units. Lecture, Tu., 11:00; laboratory, Tu., Th., 1:00–4:00. Second half-year—2 units. Tu., Th., 1:00–4:00. MC. Prerequisite: Course 8A. For Seniors and Graduates. Prescribed, Senior year, in the College of Civil Engineering. Students in the course in Sanitary Engineering take only one unit in the second half-year.

8D. Materials of Construction. Mr. HUNT.

Properties and characteristics of the materials used in engineering construction. Preparation for use; methods of testing strength and quality; preservation. Lectures.

2 hrs., first half-year—2 units. Tu., Th., 10:00. Prescribed, Junior year, in the College of Civil Engineering.

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8B. **Problems in Strength of Materials.** Professor SOULÉ.

Practical application of the principles of Course 8A.

2 hrs., second half-hear—1 unit. Th., F., 4:00. Open to those taking Course 8A.

9. **Sewer Systems.** Mr. CHANDLER.

Sanitation of cities and towns, and ventilation of dwellings. Lectures and criticisms.

2 hrs., first half-year—2 units. Tu., Th., 11:00. MC. Prescribed, Junior year, in the College of Civil Engineering, in the course in Sanitary Engineering.

11A. **Water Supply Systems.** Professor SOULÉ.

Collection, storage, and distribution of water for public or domestic use. Discussion of means and methods adopted in the best practice.

3 hrs., first half-year—3 units. M., W., F., 10:00. MC. Open to students who have taken, or who are taking, the course in Hydrodynamics (Mechanical Engineering, Course 3). Prescribed, Senior year, in the course in Sanitary Engineering, College of Civil Engineering. In addition to the lectures of the regular course, there will be lectures from time to time by Professor SCHUSSLER.

11B. **Water Analysis.** See Course 21, under Chemistry.

11C. **Retaining Walls, Weirs, and Conduits.** Professor SOULÉ.

2 hrs., second half-year—2 units. Open to those who have completed Course 8A and Mechanical Engineering 3.

12A. **Dams of Timber, Stone, or Earth.** Professor SOULÉ.

3 hrs., second half-year—3 units. M., W., F., 8:00. MC. Prescribed, Senior year, in the course in Sanitary Engineering, College of Civil Engineering.

12B. **Stone Arches and Bridges.** Professor SOULÉ.

Theory of the stone arch; the designing and construction of bridges of stone.

2 hrs., second half-year—2 units. M., F., 10:00. For Seniors and Graduates in the College of Civil Engineering. Open to students who have completed Course 8A, and who are taking or who have completed Course 13.

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13. Foundations of Structures. Professor SOULÉ.

Foundations on land, under water, or in the sea.

2 hrs., second half-year—2 units. W., 8:00–10:00. 18 MC. Prescribed, Senior year, in the College of Civil Engineering.

Analytic Mechanics.

See Course 1, under Mechanical Engineering.

Hydrodynamics.

See Course 2, under Mechanical Engineering.

Graphostatics.

See Course 6 under Drawing.

See courses under Astronomy.

GRADUATE COURSES.

14. Framed Structures. Assistant Professor RANDALL.

Continuation of Course 7A, including such subjects as swing, suspension, cantilever, and arch bridges, and the continuous girder. More advanced work in designing the details of framed structures.

3 hrs., first half-year—3 units. M., W., F., 8:00. MC. Prerequisite: Course 7A.

15. Laboratory Experiments. Professor SOULÉ.

Experiments upon, and investigations concerning, the materials used in engineering construction. Practical tests of the "theories of flexure." Tests of full-sized columns, girders, etc.

2 hrs., first half-year—1 unit. Prerequisite: Courses 8A, 8B, 8C, and 8D.

16. Specifications and Contracts. Professor SOULÉ.

Laws and forms of specifications and contracts in engineering operations. Lectures.

2 hrs., first half-year—2 units. Prerequisite: Graduation from the College of Civil Engineering.

17. Framed Structures. Assistant Professor RANDALL.

A continuation of Course 7C.

6 hrs., or more, throughout the year—2 units, or more, each half year. Prerequisite: Courses 7C and 14.

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MINING AND METALLURGY.

SAMUEL B. CHRISTY, Ph.B., Professor of Mining and Metallurgy.

ERNEST A. HERSAM, B.S., Assistant Professor of Metallurgy.

W. S. MORLEY, B.S., Instructor in Assaying, and Mill Assistant.

——— ———, Assistant in Assaying.

FRANK RICHARDS, Laboratory Helper.

The lecture courses described below are fully illustrated by lantern-slides. The laboratory courses are designed to illustrate and supplement the lecture courses.

Laboratory deposits are twenty-five dollars per half-year for laboratory courses 7A, 7B, 9, and 10. The amount returned to the student at the end of the half-year, after deducting for cost of materials actually used and for breakage of apparatus, is usually five or ten dollars.

1. **Lectures on Mining.** Professor CHRISTY.

Ores: their nature, occurrence, and relation to mining laws. Location of claims. Methods of prospecting, excavating, tunneling, shaft-sinking, and timbering.

4 hrs., first half-year. Tu., Th.. 9:00–11:00 (two hours). 12 MC. Prerequisite: Senior standing in the College of Mining. Prescribed, Senior year, to students in the College of Mining.

2. **Lectures on Mining.** Professor CHRISTY.

Winning, exploration, and exploitation. Methods of transportation and hoisting; of drainage, ventilation and lighting; of general organization and administration.

4 hrs., second half-year. Tu., Th., 9:00–11:00 (two hours), 12 MC. Prerequisite: Course 1. Prescribed, Senior year, to students in the College of Mining.

3. **Mining Laboratory.** Professor CHRISTY and Mr. MORLEY.

Lectures and laboratory practice in sharpening, hardening, and tempering hand and machine drills; the use of single and double hand drills, and of machine drills; the placing, charging, and firing of blasts.

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6 hrs., second half-year—2 units. W., 1:00–4:00; S., 9:00–12:00. 2 MC. Prescribed, Junior year, to students in the College of Mining.

4. **Summer School in Practical Mining.** (Senior Conference.)

During the vacation at the end of the Junior year, all mining students will be required to spend at least four weeks in the systematic study of practical mining, taking notes and making sketches of processes observed. This is the minimum requirement. It is recommended that all free vacation time throughout the four years be devoted to actual work underground at the various branches of practical mining. Details in every case must be arranged in consultation with Professor CHRISTY. A full report on this work must be presented and read before the Juniors and Seniors at the mining conference during the Senior year. This conference will be held weekly.

5. **Metallurgy: Structural Metals and Fuels.** Professor CHRISTY.

The classification of ores; methods and appliances for their reduction, and their bearing on the physical properties of the structural metals. Fuels, and their relative value as heat-producers.

2 hrs., first half-year. M., F.. 9:00. 12 MC. Prerequisite: Chemistry, 1, 2, 3, 4; Physics, 1, 2A, and 3. Prescribed, Junior year, in the College of Mining. Elective, Junior year, in the College of Mechanics.

6. **Metallurgy: Ore Crushing, Sampling, Fluxes.**

Assistant Professor HERSAM.

Methods of crushing ores; of sampling ores and their products; fluxes, refractory materials, and metallurgical products.

2 hrs., first half-year. M., W., 8:00. 12 MC. Prerequisite: Metallurgy 5, and Chemistry 5 and 6. Prescribed, Senior year, in the College of Mining. Required of students who elect Course 10.

7A. **Assaying.** Professor CHRISTY and Mr. MORLEY.

Lectures and laboratory practice. The proper use and care of the assay balance. Cupellation of gold and silver. Parting of gold and silver. Preparation of the sample. Scorification assays of gold and silver ores. Crucible method for these ores.

6 hrs., first half-year—2 units. Section I, M., Tu., 1:00–4:00; II, Th., F., 1:00–4:00; III, W., 1:00–4:00; S., 9:00–12:00. 2 MC.

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Conference for both sections, W., 10:00. 12 MC. Prerequisite: Chemistry, 1 to 6 inclusive; Mineralogy 1; Metallurgy 5. Prescribed, Junior year, in the College of Mining. Elective, to students in the College of Chemistry, and to other students who have the prerequisite courses.

7B. Assaying. Professor CHRISTY and Mr. MORLEY.

Lectures and laboratory practice. Fire assays of ores of lead, antimony, tin, nickel, cobalt, copper, iron.

2 hrs., second half-year—2 units. Section I, M., Tu., 1:00–4:00. Section II, Th., F., 1:00–4:00. Conference for both sections, W., 10:00. 2 MC. Prerequisite: Course 7A. Prescribed, Junior year, in the College of Mining. Elective, in the College of Chemistry, to students who elect Metallurgy 5.

8. Metallurgy of Gold, Silver, and Quicksilver. Professor CHRISTY.

Lectures on the amalgamation of gold and silver; processes for leaching silver ores; chlorination and cyanide processes with gold ores; quicksilver reduction and condensation.

2 hrs., first half-year. M., F., 10:00. 12 MC. Prerequisite: Courses 5, 6, and 7. Prescribed, Senior year, in the College of Mining.

9. Metallurgical Laboratory.

Professor CHRISTY and Assistant Professor HERSAM.

Supplementary to Course 8. Laboratory experiments in the oxidizing and chloridizing, roasting, and leaching of gold and silver ores.

6 hrs., first half-year—2 units. W., F., 1:00–4:00. 8 MC. Elective with Course 10 to students who are taking Course 8.

10. Metallurgical Laboratory: Mill Work.

Professor CHRISTY and Assistant Professor HERSAM.

Supplementary to Course 8. Experiments on a working scale in crushing, sampling, concentrating, roasting, leaching, and amalgamating gold and silver ores.

6 hrs., second half-year–2 units. Section I, M., Tu., 1:00–4:00; Section II, Th., F., 1:00–4:00. 8 MC. Elective with Course 9, Senior year, in the College of Mining. Prerequisite: Courses 5, 6, 7, and 8.

11. Metallurgy of Lead and Copper. Assistant Professor HERSAM.

Methods of smelting lead and copper ores, with particular reference to their gold and silver content.

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2 hrs., second half-year. M., F., 9:00. 12 MC. Prerequisite: Metallurgy 5, 6, 7, 8. Prescribed, Senior year, in the College of Mining.

*12. Ore Dressing. Professor CHRISTY.

Theory of ore separation; discussion of the leading methods in use for separating coarsely and finely disseminated minerals, with particular reference to the treatment of gold and silver ores.

2 hrs., second half-year—2 units. M., F., 9:00. 12 MC. Prerequisite: At least Senior standing in the College of Mining. Primarily for Graduates.

*Not to be given in 1901–02.

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DRAWING.

HERMANN KOWER, C.E., Assistant Professor of Drawing.

JOSEPH N. LECONTE, M.M.E., Instructor in Mechanical Engineering.

BERNARD R. MAYBECK, Instructor in Architecture.

C. C. JUDSON, Instructor in Free-hand Drawing.

A. V. SAPH, Instructor in Drawing.

1. Instrumental Drawing. Mr. SAPH.

Instrumental drawing, geometrical problems, mathematical curves, lettering.

6 hrs., first half-year—2 units. Section I, Tu., Th., 1:00–4:00; II, M., F., 1:00–4:00; III, W., 1:00–4:00, S., 9:00–12:00; IV, Tu., Th., 9:00–12:00. Prescribed, Freshman year, in the Engineering Colleges.

1A. Elementary Free-hand Drawing. Mr. JUDSON.

Drawing in pencil from models, embracing the study of light and shade (chiaroscuro) and perspective; with lectures.

3 hrs., throughout the year—1 unit each half-year. Section I, W., 1:00–400; II, Tu., 1:00–4:00; III, Tu., 9:00–12:00; IV, F., 1:00–4:00. Prescribed, Freshman year, in the Engineering Colleges.

2A. Descriptive Geometry.
Assistant Professor KOWER and Mr. SAPH.

Fundamental problems on point, line, plane; sections; intersections.

6 hrs., second half-year—2 units. Section I, Tu., Th., 1:00–4:00; II, M., F., 1:00–4:00; III, W., 1:00–4:00, S., 9:00–12:00; IV, Tu., Th., 9:00–12:00. Prescribed, Freshman year, in the Engineering Colleges. Prerequisite: Course 1.

2B. Descriptive Geometry. Assistant Professor KOWER.

Perspective, isometric projection, shades and shadows.

6 hrs., first half-year—2 units. Section I, Tu., Th., 9:00–12:00; II, Tu., Th., 1:00–4:00. Prescribed, Sophomore year, in the Colleges of Mechanics and Civil Engineering. Prerequisite: Course 2A.

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3. **Mechanical Drawing.** Assistant Professor KOWER.

Drawing of simple machine parts.

6 hrs., second half-year—2 units. Tu., Th., 1:00–4:00. Prescribed, Sophomore year, in the College of Mechanics.

4. **Mechanical Drawing.** Mr. LECONTE.

Continuation of Course 3.

6 hrs., second half-year—2 units. M., F., 1:00–4:00. Prescribed, Junior year, in the College of Mechanics.

5. **Graphostatics.** Assistant Professor KOWER.

Graphical analysis of stresses in engineering structures.

2 hrs., first half-year. Section I, M., 2:00–4:00; II, W., 2:00–4:00; III, F., 2:00–4:00. Prescribed, Junior year, in the Colleges of Mechanics, Mining, and Civil Engineering.

6. **Sewer Construction.** Assistant Professor KOWER.

Designing of mechanical apparatus used in sewer systems, and for the drainage of lands; such as flush tanks, manholes, large sewers, connections, etc.

6 hrs., second half-year—2 units. Tu., Th., 1:00–4:00. M. Prescribed, Junior year, in the Course of Sanitary Engineering, College of Civil Engineering, in connection with the course in Sewer Systems, Civil Engineering 9.

7. **Construction.** Assistant Professor KOWER.

This course is a continuation of Course 5, and includes the designing of engineering structures, such as roof-trusses, bridges, etc.

6 hrs., throughout the year—2 units each half-year. M., F., 1:00–4:00. Prescribed, Senior year, in the College of Mechanics, except to those who take the course in Electrical Engineering.

8A. **Elements of Structural Drawing.** Mr. MAYBECK.

Graphical representation of bonds used in masonry; arch stones, gateways, pillars, domes, groined arches, cloistered arches, joints used in combining wood and iron, steel, etc.

3 hrs., throughout the year—1 unit each half-year. M., 1:00–4:00. E. Elective, Sophomore year, in the College of Civil Engineering, alternative with Mechanical Practice 8A and 8B, and Mineralogy 1.

9. **Free-hand Lettering and Round Writing.** Mr. SAPH.

3 hrs., second half-year—1 unit. Open to students in Drawing.

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ARCHITECTURE.

BERNARD R. MAYBECK, Instructor in Architecture.

1. Elements of Architecture and Architectural Composition.
Mr. MAYBECK.
Hours and credit value arranged with the students. Prerequisite: For students wishing to become architects, Freshman standing; for others, at least Junior standing.

*2. Perspective Drawing: Lectures. Mr. MAYBECK.
Hours and credit value to be arranged with students. Prerequisite: At least Junior standing; Drawing 2A and 2B, or their equivalent.

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AGRICULTURE, HORTICULTURE, AND ENTOMOLOGY.

E. W. HILGARD, Ph.D., LL.D., Professor of Agriculture and Agricultural Chemistry; Director of Agricultural Experiment Stations.

E. J. WICKSON, M.A., Professor of Agricultural Practice, and Superintendent of University Extension in Agriculture.

R. H. LOUGHRIDGE, Ph.D., Assistant Professor of Agricultural Geology and Agricultural Chemistry.

C. W. WOODWORTH, M.S., Assistant Professor of Entomology.

M. E. JAFFA, M.S., Assistant Professor of Agriculture; in charge of Laboratory of Agricultural Chemistry.

G. E. COLBY, M.S., Instructor in Laboratory of Agricultural Chemistry.

F. T. BIOLETTI, M.S., Instructor in Charge of Viticulture, Olive Culture, and Bacteriology.

LEROY ANDERSON, M.S., Instructor in Dairy Husbandry.

ARCHIBALD R. WARD, B.S., Veterinarian in connection with the Department of Dairy Husbandry.

E. H. TWIGHT, Assistant in Viticulture.

F. J. SNOW, Student Assistant in Agricultural Laboratory.

Courses 1A, 1B, 4A, and 4B, are prescribed in the College of Agriculture. All the others are elective. Attention is called to the fact that the prescribed technical work (Courses 1 to 4 in Chemistry, 1 and 2 in Botany, and 1A, 1B, 4A, 4B in Agriculture) includes only that which is required of all students in the College of Agriculture; in addition to these there must be elected some special lines of study in Agricultural Chemistry, Practical Agriculture, Horticulture, Irrigation, Viticulture, Botany, Entomology, etc. These studies should be taken in groups corresponding to different professional lines, *viz:* Practical Agriculture and Horticulture; Agricultural Engineering and Irrigation; Agricultural Chemistry, Physics, and Geology; Agricultural Biology (Zoölogy, Entomology, and Botany); Agricultural Technology (sugars, starch, bread, wine, fats, canning, etc.). For each of these lines, courses will be laid out by the corresponding instructors.

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All courses in this department are given in the Agricultural Building.

Laboratory deposits are fifteen dollars per half-year for each chemical laboratory course.

AGRICULTURAL CHEMISTRY AND SOIL PHYSICS.

1A. General Course.

Professor HILGARD and Assistant Professor LOUGHRIDGE.

Chemistry of plants and their products. Inorganic ingredients of plants; ash analysis. Physics of plants; mechanism of nutrition and movement of the juices.

3 hrs., first half-year. Tu., Th., S., 11:00. Prescribed, Junior year, in the College of Agriculture.

1B. Chemistry and Physics of Soils.

Professor HILGARD and Assistant Professor LOUGHRIDGE.

Origin, formation, and classification of soils. Physical properties and mechanical analysis; chemical composition. Soil analysis—its methods, utility, and interpretation. Policy of culture, exhaustion of soils and their restoration; drainage, irrigation, manures.

3 hrs., second half-year. Tu., Th., S., 11:00. Prerequisite: Botany 1 and 2; Chemistry 1, 2, 3, and 4. Prescribed, Junior year, in the College of Agriculture.

1D. The Physics of Soils.

Assistant Professor LOUGHRIDGE.

Relations of soils to temperature, water, air, etc.

1 hr. lecture, with or without 3 hrs. laboratory work—1 or 2 units, first half-year. W., 11:00.

3. Laboratory of Agricultural Chemistry.

Assistant Professor JAFFA and Mr. COLBY.

This course is devoted primarily to the prosecution of chemical and physical researches in relation to general agriculture and horticulture. The results of the work are reported to the persons interested, and are published currently in the form of bulletins, ultimately in the form of annual reports. Desk-room is also provided for about twenty advanced and special students, for instruction in the analysis of soils, waters, fertilizers, sugars, sugar-beets, and other agricultural products.

12 or 15 hrs., throughout the year (as the student may elect)—4 or 5 units, each half-year. M., Tu., W., Th., F., 1:00–4:00; S., 9:00–12:00.

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ADVANCED COURSES.

*1c. Relation of Climate to the Soil and to Agricultural Practice.
Professor HILGARD.

1 hr. lecture, with or without 3 hrs. laboratory work—one or two units, second half-year. F., 2:00. To be offered in alternate years.

17. Soil Areas and Soil Distribution in California.
Assistant Professor LOUGHRIDGE.

Lectures.

1 hr., second half-year. W., 11:00. Prerequisite: Agriculture 1A and 1B.

FOR GRADUATES.

*15. Advanced Soil Chemistry and Soil Physics.
Professor HILGARD and Assistant Professor LOUGHRIDGE.

Lectures.

1 hr., either half-year.

22. Laboratory Researches in Agricultural Chemistry.
Assistant Professor JAFFA and Mr. COLBY.

ANIMAL INDUSTRY AND DIETETICS.

18. Stock Breeding and Dairying. Mr. ANDERSON.

History, characteristics, and adaptability of the various breeds. Dairy husbandry.

3 hrs., first half-year. M., W., F., 10:00.

4c. Chemistry of Dairying. Assistant Professor JAFFA.

Lectures.

2 hrs., first half-year. M., W., 1:00.

3B. Principles of Nutrition. Assistant Professor JAFFA.

Discussion of the functions of nutrients and the theories of digestion.

1 hr., first half-year. S., 9:00.

3c. Composition and Use of Human Foods; Food Adulteration.
Assistant Professor JAFFA.

Lectures.

1 hr., second half-year. Section I, S., 9:00; II, 10:00. (For laboratory work in this subject see Course 3D.)

*Not to be given in 1901-02.

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3A. Foods and Feeding. Assistant Professor JAFFA.

Lectures on cattle foods; principles of rational feeding of farm animals.

2 hrs., second half-year. Tu., Th., 1:00.

3D. Laboratory Course. Assistant Professor JAFFA.

Analysis of dairy products, human and cattle foods, and detection of adulterations.

6 hrs., either half-year. Tu., Th., 1:00–4:00. Prerequisite: Chemistry 4 and 5B.

3E. Special Researches in Animal Nutrition. Assistant Professor JAFFA.

Advanced course.

1 hr. lecture, 6 hrs. laboratory work—3 units, second half-year.

AGRICULTURE, HORTICULTURE AND VITICULTURE.

4A. Agriculture. Professor WICKSON.

Field cultures of grains, vegetables, and forage plants.

3 hrs., first half-year. M., W., F., 9:00. Prescribed, Senior year, in the College of Agriculture.

4B. Horticulture. Professor WICKSON.

Principles and practice of fruit growing in semi-tropical countries, with special reference to Californian conditions and methods.

3 hrs., second half-year. M., W., F., 9:00. Prescribed, Senior year, in the College of Agriculture.

5D. Viticulture. Mr. BIOLETTI.

A general course in the methods of establishing and maintaining a vineyard, with special reference to conditions existing in California. Lectures.

2 hrs., second half-year. Tu., Th., 9:00.

2, Œnology. Mr. BIOLETTI.

A special course in vinification and the manufacture of grape products, including unfermented grape juice, sparkling wines, etc.

2 hrs., first half-year. M., F., 8:00.

2A. Analysis of Must and Wine. Mr. COLBY.

1 hr. lecture, 6 hrs. laboratory work—3 units, first half-year. Lecture, M., 1:00; laboratory, Tu., Th., 9:00–12:00.

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2B. Adulterations of Fermented and Distilled Liquors. Mr. COLBY.

1 hr. lecture, 6 hrs. laboratory work—3 units, second half-year. Lecture, M., 1:00; Laboratory, Tu., Th., 9:00–12:00.

It is essential that students entering courses 2, 2A, and 2B should have some knowledge of elementary chemistry; and previous experience in wine-making will be of material advantage.

5B. Olive Culture. Mr. BIOLETTI.

Culture, selection of varieties, soils, and plantation; making and treatment of olive oil; pickling, drying, and marketing of olives. Lectures without laboratory work.

1 hr., second half-year. S., 8:00.

FOR GRADUATES.

***6. Sugar-beet Industry.** Professor HILGARD.

1 hr., second half-year. To be given in alternate years.

***21. Advanced Instruction in Horticulture.** Professor WICKSON.

ECOLOGY AND ENTOMOLOGY.

PRIMARILY FOR UNDERGRADUATES.

7A. Elementary Lectures. Assistant Professor WOODWORTH.

First half-year: (*a*) General Entomology, 1 hr.; (*b*) Economic Entomology, 1 hr. Second half-year: (*c*) Ecology, 2 hrs.

1 or more hrs., either half-year. Tu., Th., 11:00. Prerequisite: Zoölogy 1A. See also Courses 8 (Apiculture), 9 (Plant Diseases), and 9D (Insecticides and Fungicides).

7B. Elementary Laboratory. Assistant Professor WOODWORTH.

First half-year: (*a*) Morphology; (*b*) Entomotaxy. Second half-year: (*c*) Scale Insects; (*d*) Insectary Work. Each topic 6 to 9 hrs.

2 or more units., either half-year. Hours to be arranged.

8. Apiculture. Assistant Professor WOODWORTH.

Lectures on the structure and habits of bees; hives, apiary equipment, and management.

1 hr., second half-year. Th., 9:00.

*Not to be given in 1901–02.

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FOR GRADUATES AND ADVANCED UNDERGRADUATES.

11. **Advanced Lectures.** Assistant Professor WOODWORTH.

First half-year: (*a*) Ontogeny, 3 hrs.; second half-year: (*b*) Phylogeny, 3 hrs.

3 or more hrs., either half-year. M., W., F., 4:00.

12. **Advanced Laboratory.** Assistant Professor WOODWORTH.

First half-year: (*a*) Variation, (*b*) Embryology, (*c*) Taxonomy; second half-year: (*d*) Morphogeny, (*e*) Field Ecology, (*f*) Taxonomy—each topic 9 to 12 hrs. Course 23 (*b*) must be taken concurrently with this course.

3 or more units, either half-year. Hours to be arranged.

23. **Entomological Seminaries.** Assistant Professor WOODWORTH.

Continue throughout the year, but may be taken in either half. (*a*) Entomological Literature; (*b*) Laboratory Conference (required of students in Courses 12 and 24); (*c*) Seminary on Specialization—each topic 1 hr. per half-year.

1 or more hrs. Hours to be arranged.

24. **Research Work.** Assistant Professor WOODWORTH.

Course 23 (*b*) must be taken concurrently with this course.

At least 9 hrs.—3 or more units.

PLANT DISEASES AND BACTERIOLOGY.

9. **Plant Diseases.** Assistant Professor WOODWORTH and Mr. BIOLETTI.

The effect on plants of unfavorable conditions and of the injurious attacks of insects, fungi, and other organisms, is studied from the standpoint of the farmer and fruit grower. The etiology of the diseases, the theories and methods of treatment, the action of remedies, and the modes of their application. Lectures.

2 hrs., first half-year. Tu., Th., 9:00.

9D. **Insecticides and Fungicides.** Mr. COLBY.

The composition and compounding of remedies.

1 hr., first half-year. W., 4:00.

9A. **Bacteria.** Mr. BIOLETTI.

Lectures on bacteria and the relation of micro-organisms to agriculture, industry, and disease.

1 hr., second half-year. M., 11:00.

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9B. Elementary Bacteriological Laboratory. Mr. BIOLETTI.

The technics of bacteriology, and the isolation and study of forms.

6 hrs., second half-year—2 units. Two periods chosen from M., W., Th., F., 1:00–4:00.

9C. Zymology. Mr. BIOLETTI.

Lectures (once a week) on the micro-organisms of fermentation, especially the moulds, yeasts, and bacteria occurring on grapes and in fermented liquors; with laboratory work in the purification of yeasts, the testing of varieties of yeasts, and the microscopic examination of fermented liquors.

7 hrs., first half-year—3 units. M., W., F., 1:00–4:00.

AGRICULTURAL LITERATURE.

13. Seminary Course.

An elementary course designed for the study of current agricultural literature, especially the publications of the Agricultural Experiment Stations of the several States.

1 hr., throughout the year. Tu., 10:00, Professor WICKSON; other instructors in the Department of Agriculture participating. Open to all students. Regular students in the College of Agriculture are advised to begin the course in the Freshman year.

UNIVERSITY EXTENSION IN AGRICULTURE.

14. Seminary Course.

Study and discussion of policies, methods, and practices of university extension in agricultural lines, as pursued by State Universities and Colleges of Agriculture.

1 hr., throughout the year. Th., 10:00. Professor WICKSON; other instructors in the Department of Agriculture participating. Open to all students.

Farmers' Institutes are held at various points in the State to the number of about one hundred each year. Announcements of dates and subjects are made a short time previous to each Institute. The Institutes are conducted by Professor WICKSON, Mr. COOK, Mr. FOWLER, and other members of the staff of the College of Agriculture.

BOTANY.

The following courses directly related to agriculture, and prescribed or elective in the College of Agriculture, are given in the Department of Botany, where the announcement will be found in detail.

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8. Economic Botany. Mr. DAVY.

Lectures on the uses of plants and the principal properties of the most important natural orders.

2 hrs., second half-year.

*8A. Weeds, and Seed Testing. Mr. DAVY.

Lectures and laboratory work.

2 hrs., first half-year. To be offered in alternate years.

*8B. Forage Plants. Mr. DAVY.

Lectures and laboratory work.

2 hrs., first half-year. To be offered in alternate years.

SPECIAL DAIRY COURSE.

A special course of instruction in dairy husbandry will be given during the first half-year, beginning Wednesday, October 9th, and closing Thursday, December 12th. The course will consist of practical work in making butter and cheese, testing milk for fat and adulterations, and operating dairy machinery, supplemented by lectures and recitations treating of the principles involved in modern dairy practice. For special annonncement giving detailed information in regard to the course address the College of Agriculture.

*Not to be given in 1901–02.

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IRRIGATION.

ELWOOD MEAD, M.S., C.E., Professor of the Institutions and Practice of Irrigation.

J. M. WILSON, C.E., Assistant Professor of Irrigation.

The purpose of this department is to give instruction in the methods and practices of irrigators in applying water to crops; the practical details of the construction, maintenance, and operation of canals and reservoirs; and to furnish an opportunity for the study of the legal, social, and economic problems arising out of the development of irrigation in the arid west.

Courses 1, 2, and 3 are designed to meet the needs of engineering and agricultural students who wish to make a specialty of irrigation work. They appear as part of the Course of Irrigation Engineering in the College of Civil Engineering. They are also elective in the other Engineering Colleges and in the College of Agriculture.

Students of the Agricultural Department desiring to take these studies would do well to include Drawing and Surveying 1A, 1B, and 1C in their elective work for the first two years.

1. Organization of the Irrigation Industry.

Professor MEAD and Assistant Professor WILSON.

A study of the present condition of irrigation development in the United States; irrigation legislation; methods of establishing rights to water; interstate problems; conditions necessary to development of agricultural resources of the arid west; comparisons of irrigation methods and laws of other lands with those of the United States; irrigation in humid sections of the United States.

3 hrs., first half-year. Hours to be arranged. Prescribed, Senior year, in the Course in Irrigation Engineering, College Civil Engineering, and in some courses in College of Agriculture.

2. Irrigation Engineering. Assistant Professor WILSON.

A study of the principles and practice governing in the installment and operation of irrigation plants. The location, construction,

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and maintenance of canals and reservoirs, with detailed study of irrigation structures, such as head gates, flumes, measuring boxes, wiers. Methods and instruments used in measuring the flow of water.

3 hrs., first half-year. M., W., F., 4:00. A. Prescribed, Junior year, in the Course in Irrigation Engineering; elective in the College of Civil Engineering and in the College of Agriculture.

3. Irrigation Economics. Assistant Professor WILSON.

A study of business methods used in the operation of irrigation plants; individual and coöperative works; corporate enterprises; water right contracts; methods of applying water to crops; duty of water.

3 hrs., second half-year. Hours to be arranged. Prescribed, Junior year, in the Course in Irrigation Engineering; elective in other Engineering courses and in the College of Agriculture.

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MILITARY SCIENCE AND TACTICS.

HENRY DE H. WAITE, Graduate U. S. Military Academy, Professor of Military Science and Tactics.

1. Practical Course. Professor WAITE.

Covering the following subjects: (*a*) Infantry exercises in the schools of the soldier, company, battalion, and regiment; extended-order movements, target practice, duties of a sentinel, ceremonies; patrols, advance guards, rear guards, and outposts; military topography. (*b*) Artillery exercise in the manual of the piece, and mechanical maneuvers; saber exercises. (*c*) Military signaling with flag, torch, and heliograph; telegraphy. (*d*) Band practice. When the weather is inclement, lectures are delivered to the regiment on the aims of the department, discipline, drill regulations, etc. Examinations are held at the close of each half-year, covering the subjects taught on the drill-ground.

2 hrs., throughout the year—½ unit each half-year. M., W., 11:00. Prescribed during the first three years of their attendance, to all able-bodied male undergraduate students; and in the fourth year, to officers of the regiment.

2A. Theoretical Course. Professor WAITE.

Lectures and recitations on the organization and administration of the United States Army, supply and discipline of the company, military law, field-works.

1 hr., first half-year. Tu., 4:00. Prescribed, during the fourth year of their attendance, to all able-bodied male undergraduate students.

2B. Theoretical Course. Professor WAITE.

Continuation of Course 2A. Preparation for war, the staff, tactics of the three arms, reconnaissance, security, marches, grand tactics, minor operations, logistics, strategy, military history, and material of war.

1 hr., second half-year. Tu., 4:00. Prescribed, during the fourth year of their attendance, to all able-bodied male undergraduate students.

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PHYSICAL CULTURE.

W. E. MAGEE, Assistant Professor and Director of Physical Culture.

ARNOLD A. D'ANCONA, A.B., M.D., Professor of Hygiene.

GENEVRA E. MAGEE, Assistant in Physical Culture.

GEORGE F. REINHARDT, B.S., M.D., Instructor in Physical Culture.

——— ———, Assistant in Physical Culture.

MARY B. RITTER, M.D., Medical Examiner of Women and Lecturer on Hygiene of Women.

The work for men in Physical Culture is conducted in the Harmon Gymnasium on the University grounds.

Each male student is examined from time to time, with reference to his health and physical development, and appropriate exercises are prescribed. These exercises are conducted in squads, so far as is practicable; but in many cases individual instruction is given. A supervision of student athletics is exercised by the Department. The expenses for each student are: Four to five dollars for a regulation suit, which consists of one pair of navy blue full tights, one white cotton or woolen shirt, one pair navy blue trunks, one supporter, and one pair rubber-soled shoes; and an annual rental of one dollar for a locker.

The Hearst Gymnasium is reserved for the exclusive use of young women. The young women are examined with reference to their health by the physician for women; and exercises adapted as nearly as possible to individual needs are prescribed. The expenses are: (1) from four to five dollars for a regulation suit; (2) an annual rental of one dollar for a locker.

Special Teachers' Recommendations in physical culture will be granted to graduates of any of the colleges at Berkeley who complete, in addition to the regular four years' course, sixteen units in the theory of Physical Culture and four units in Anatomy. A circular containing detailed information concerning the conditions under which the Special Teachers' Recommendation is granted may be had by addressing the Director.

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1. **Elementary Course.**

Assistant Professor MAGEE and Dr. REINHARDT.

The seventeen setting-up exercises described in the Drill Regulations of the United States Army. The uses of Sargent's developing appliances explained and illustrated. Chest-weights, dumb-bells, bar-bells, and Indian clubs. Exercises in walking and running; mat exercises. Vaulting-horse, parallel bars, trapeze, and horizontal bar.

3 half-hours, throughout the year. Tu., Th., F., 4:00. Prescribed to all male undergraduates during the first year of their attendance at the University.

2. **Advanced Course.**

Assistant Professor MAGEE and Dr. REINHARDT.

Advanced exercises with chest-weights, vaulting-horse, parallel bars, trapeze, and horizontal bar. The knotted rope. The peg pole. A general review of the first year's work.

3 half-hours, throughout the year. Tu., Th., S., 8:00. Prescribed to all male undergraduates during the second year of their attendance at the University.

3. **Course for Young Women.**

Assistant Professor MAGEE, Mrs. MAGEE, and Miss ———.

Exercises adapted to the needs of young women who elect the course. The developing appliances, relaxing exercises, walking, running, and mat exercises, chest-weights, dumb-bells, wands, bar-bells, Indian clubs, stall bars, Swedish boms. Recreative exercises.

5 half-hours, throughout the year. Two sections. M., Tu., W., Th., F., 3:00; 4:00. Prescribed to all female undergraduates during the first year of their attendance at the University.

4. **History of Physical Culture.** Assistant Professor MAGEE.

The gymnastic training in ancient Greece; modern training in Sweden, Germany, and England; physical culture in the United States, and its further development.

2 hrs., first half-year. M., F., 10:00.

5. **Anthropometry.** Assistant Professor MAGEE.

History of anthropometry—Greek standards, modern art proportions, description of modern instruments, charts, the technique of measurements, items and rules of the American Association for the Advancement of Physical Education.

1 hr., second half-year. M., 10:00.

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6. Exercises Adapted to Public Schools.
Assistant Professor MAGEE.

Breathing exercises; the proper manner of sitting, standing, walking, running; free movements, figure marching, light gymnastics with dumb-bells, bar-bells, wands, Indian clubs; setting-up exercises, chest-weights, mat exercises; elementary exercises on vaulting-horse, parallel bars, horizontal bar; care of apparatus; recreative games.

1 hr., throughout the year. W., 10:00.

7. Exercises Adapted to Public Schools.
Assistant Professor MAGEE.

Continuation of Course 6.

1 hr., throughout the year. Th., 10:00.

8. Physiology of Exercise. Assistant Professor MAGEE.

Coördination of exercises; organs of movement; automatism in exercise; local fatigue; training; exercises of strength, speed, and endurance; mechanism of different exercises; general effects; local effects.

1 hr., second half-year. F., 10:00.

9. Physical Examinations and Diagnosis.
Assistant Professor MAGEE.

Methods of measuring, including photography; testing and examining individuals, to note variations from the normal and to ascertain their fitness for particular exercises.

2 hrs., first half-year. Tu., S., 10:00.

10. Acquired Deformities. Assistant Professor MAGEE.

Curvatures of the spine, deformities of the thorax, and other deformities produced by incorrect manner of sitting, standing, or walking.

1 hr., second half-year. S., 10:00.

11. Human Anatomy and Demonstrations. Professor D'ANCONA.

1 hr., throughout the year. M., 9:00.

12. Hygiene. Professor D'ANCONA.

Lectures on personal hygiene as related to physical culture; first aid in case of accident.

1 hr., throughout the year. W., 9:00.

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13. Hygiene. Dr. RITTER.

Lectures and recitations covering the general subjects of personal hygiene, foods, and municipal hygiene. Demonstrations illustrating the lectures will be made by means of microscopical preparations, diagrams, and models.

2 hrs., throughout the year. Tu., Th., 3:00. Elective to all women students.

Practical talks on diet, sleep, exercise, bathing, clothing, injudicious exercise, etc., will be given by the Director.

THE LIBRARY.

JOSEPH C. ROWELL, A.B., Librarian.

J. D. LAYMAN, B.L., Assistant Librarian.

ANNA K. FOSSLER, B.S., Cataloguer.

FANNIE S. BONTÉ, Assistant in the Library.

J. ARTHUR ROWELL, Assistant in the Library.

——— ———, Assistant in the Library.

AMY L. PHELAN, Assistant in the Library.

The Use of the Library. Mr. ROWELL.

Introductory lectures, given to the entering class at the opening of each academic year. Description of the University Library; its contents, arrangement, and catalogues; use to be made of books of reference, bibliographies, and indexes; methods of reading and of research in books, especially as related to university studies.

In addition to this general introduction, personal assistance and suggestion upon all matters connected with the use of the Library will be given at all times, upon application to the Librarian or his assistants.

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REGISTRATION.

To the Student. In making up your list of courses, consult this ANNOUNCEMENT OF COURSES and such supplementary announcements as may have been issued; consult, also, the SCHEDULE OF EXERCISES. Give the exact name and number of each course, following in each case the latest announcement. Freshmen should confer with their advisers regarding plans of study.

The edition of the ANNOUNCEMENT is necessarily limited. The copy handed you at the beginning of the academic year should be preserved for use throughout the year.

(For the requirements for the several degrees, see the University REGISTER.)

REGULATIONS GOVERNING CHOICE OF STUDIES.

1. Regular Students in the *Colleges of Letters, Social Sciences, Natural Sciences,* and *Commerce* are not expected to take more than sixteen units a week during any half-year. In the first half of the Freshman year they may take not more than nineteen units a week, provided they have no entrance deficiencies; and after the first half of the Freshman year, they may take nineteen units a week during any half-year, provided they have no entrance deficiencies and no deficiencies in University work.

2. In the *Colleges of Agriculture, Mechanics, Mining, Civil Engineering,* and *Chemistry* there is a certain minimum of studies prescribed. Regular students of these colleges may take not more than nineteen units a week on complying with the conditions specified in ¶ 1, above.

3. A regular student may be required or allowed to take a smaller amount of work than the minimum stated above.

4. Special Students have free election, subject to the requirement that they confine their attention to some special study and its related branches. During their first half-year at the University they may take not more than nineteen units per week; and after the first half-year they may take nineteen units a week, provided they have incurred no deficiencies.

5. Limited Students have all their studies elective, but they are limited to thirteen units a week.

6. Any student having a deficiency—whether it be an entrance or a college deficiency—remaining unremoved for more than one year, will be restricted in his choice of studies to thirteen units a week until the deficiency shall have been removed.

7. All able-bodied male Undergraduates, including Special Students, are required to devote to military exercises two hours a week during the first three years, and one hour a week during the fourth year; and all Undergraduates, including Special Students, are required to devote to exercises in physical culture five half-hours a week during their first year's residence at the University. The Practical Course in Military Science is credited at the rate of one-half unit per half-year, and the Theoretical Course at the rate of one unit per half-year.

8. No student will be permitted to enter upon the study of any subject if the officer of instruction in charge of that subject is satisfied that by reason of lack of preparation he is not competent to undertake it. This rule takes precedence of all others.

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